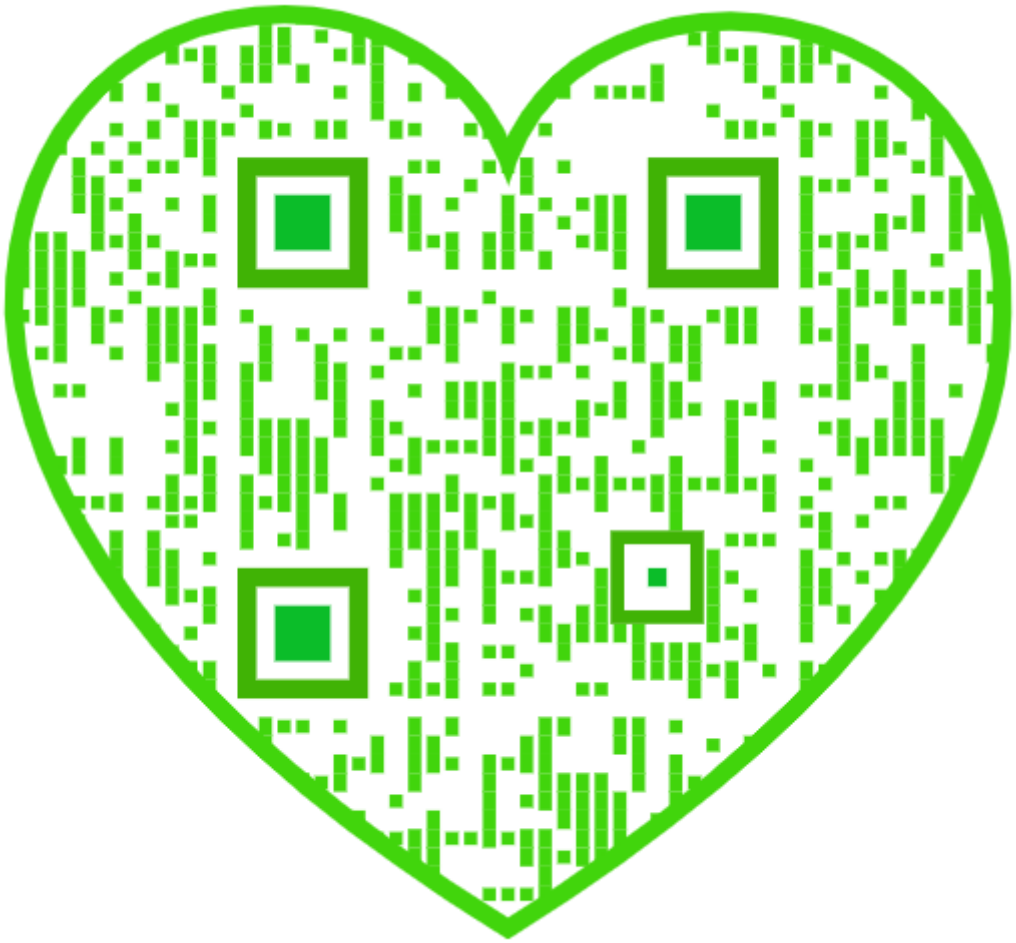

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THE

BEE PRESERVER.

THE

BEE PRESERVER:

OR

PRACTICAL DIRECTIONS FOR THE MANAGEMENT AND PRESERVATION OF HIVES.

TRANSLATED FROM THE FRENCH OF

JONAS DE GELIEU,

LATE MINISTER OF LIGNIERES, AT PRESENT MINISTER OF THE CHURCHES OF COLOMBIER AND AUVERNIER, IN THE PRINCIPALITY OF NEUCHATEL; MEMBER OF THE SOCIETÉ ECONOMIQUE DE BERNE,

&c. &c. &c.

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TO

THE HIGHLAND SOCIETY OF SCOTLAND.

In respectfully dedicating this little Work to the Highland Society of Scotland, the Translator hopes, that, under their efficient and enlightened patronage, it may be made generally known in Scotland, where the system which it explains is calculated to be as extensively applicable, and as highly profitable, as it has proved in the native mountains of its amiable and venerable Author. It seems, indeed, both from the plain practical directions which it contains, and the valuable discoveries which it communicates relative to the history and economy of bees, to be singularly adapted to forward the views of the Society, who have this year turned their attention to the encouragement of Apiaries among the peasantry of our own country; and it is no small advantage, that the rules laid down are applicable to hives of every form.

The Translator has no fear of its being objected, that plans which are very suitable in Switzerland, may be less successful as applied to Scotland. Switzerland and Scotland present so many points of resemblance—in their mountains—in their valleys—and in their climate—that which is be-

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neficial in the one, can scarcely fail to be so in the other. And as the Swiss honey is known to be not only very abundant, but of a very superior flavour, especially in those districts where DE GELIEU's or some similar plan is adopted, the Translator is desirous to see the simple and successful methods of that country transferred to our own, that the Scottish peasantry may derive from their practice the same advantages. To the Swiss peasantry, bees are a great source of wealth; a stranger is attracted by the appearance of substantial comfort, conveyed by well appointed apiaries, where the hives are ranged in double and triple rows along the sunny side, and under the shelter of the projecting roofs of the cottages; and in Scotland there is little doubt that, if similar care were bestowed on the cultivation of bees, they would be equally profitable.

EDINBURGH,
29th April 1829.

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THE

BEE PRESERVER.

AUTHOR'S PREFACE.

HAVING attained old age, I think it a duty, before quitting the world, to communicate to the public the observations I have made during sixty-four years that I have been occupied with bees. From my earliest years I have been very fond of these admirable insects. I began to observe them under the direction of my father, JACQUES DE GELIEU, pastor of the church of Bayards, and afterwards of that of Verrieres, in the principality of Neuchatel. He instructed me in the principles of this interesting study, and taught me to like and to admire it, by making me read the memoirs of the immortal REAUMUR,

with whom he had the honour to correspond. Being a nice observer, he had prepared, so early as 1746, a work in two volumes, entitled "A New and Economical Method for the Preservation and Increase of Bees, and how to procure a more abundant supply of Honey and Wax." But when his work was ready for the press, he lost in one day, by an unfortunate accident, the whole of his hives except one, which he presented to me, and which I subsequently managed under his direction.

Thrown from that time into a succession of pressing occupations, he lost sight of the printing of his work, which is now in my possession, in his own handwriting. It contains the description of the storied hive, of which he was the inventor, and which has since been so variously modified. These hives have been made known only through his correspondence with M. DE REAUMUR, and other literary men, as will appear from the note at the end of this Preface.

In the collection of observations which I now present to the public, I limit myself to what is strictly practical, leaving to superior minds, the SWAMMERDAMS, the REAUMURS, the SHIRACHS,

the HUBERS, to dive into the theory with which they are so successfully engaged.

Theory, however, leads to practice; and I have built on the foundation which they have so skilfully laid down. I shall make known what my long experience has taught me to consider the best form of hives. To ascertain which merited the preference, I mixed all sizes and shapes of them in my apiary, noting down their condition and product, thus securing a result to which no doubt could attach; convinced that it is easier to multiply hives in good seasons than to preserve them in bad ones, since, in the first case, one has only to leave them in some measure to themselves, while in the second there must be assiduous care and attention bestowed on them. Vexed at hearing of the great losses that have so generally taken place of late years, and of the sensible and rapid diminution of these precious insects, I shall point out how I succeeded in preserving mine in the worst seasons, especially in those of 1812 and 1813; and I shall lay down the principles from which no one should swerve, if he wishes to be constantly successful.

Many people are fond of bees—indeed have a

passion for them; but it is not enough to be fond of them,—they must be skilfully taken care of, according to certain rules, applicable in every case, but more particularly in bad years. Mistaken care annoys them—niggardliness ruins them. In laying down rules, I shall always take care to assign my reasons for them.

Among the discoveries which I had the happiness to make, there is one of the greatest importance to the practical apiarian, of which I had not even the slightest suspicion, and which astonished me so much that I could not believe my eyes. It was only after trials a hundred times repeated and diversified, that I could fully convince myself. The fact is certain, the reason is to me unknown, and I leave to persons more learned than myself to give the explanation.

I have read most of the treatises that have been published on bees, and have found errors in most of them. To avoid them myself, I shall advance nothing that I have not verified by numerous experiments, which every one may repeat. I shall make my narrative as short as possible.

I have said that the storied hives invented by my late father, were known only through his

correspondence with M. DE REAUMUR, and other literary men; the following is the proof:

Extract from *the Corps d'Observation of the Society of Commerce and Agriculture of Great Britain*, 1757–58. Printed at Rennes in 1761, page 162.

" Monsieur de la *Bourdonaye, Procureur General-Syndic*, to whom the custom of our peasants (of drowning the bees, or suffocating them with sulphur, in order to deprive them of all the store they have laid up to maintain them during the winter) has been long known, wrote to M. DE REAUMUR, during the last assembly of the states, 1756, to ask for some instructions on this subject.

" This academician pointed out, in his answer, the methods which he had expounded in the fifth volume *des Memoires pour servir à l'Histoire Naturelle des Insectes*; but he recommends, more particularly, to use the curiously shaped hives, invented by GELIEU, a gentleman of the principality of Neuchatel.

" REAUMUR'S letter, which, at first sight, seems to contain a sufficient description of GELIEU'S hive, does not clear up certain difficulties

that presented themselves in the detail, when we come to attempt their construction from his directions; and therefore NEVEL, member of the Committee of Rennes, resolved to request a pattern hive from REAUMUR himself, which he accordingly obtained, and sent to the society. It appears that hives of this kind would supply all that can be desired in the management of bees; but they would cost more than one louis each—a price infinitely beyond the reach of a labouring man, and which would even be too great for the rich. It was necessary, therefore, to think of profiting by the invention of GELIEU, in contriving hives so cheap that every peasant might use them.

" Monsieur DE LA BOURDONAYE, who paid great attention to this subject, kindly communicated to the Society both the letter of REAUMUR, and the plan which he himself had formed, of making hives at a small expence. He began by using, on his own estate, those which he recommended as an experiment to the Society. It was called an *experiment*, because, in reality, notwithstanding the probability of success attending the use of hives like those of which he sent

the model, his modesty made him afraid that experience might, in some shape, belie his hopes. The Society was not long in ordering hives to be made after the model. They have made trial of them in the different faubourgs of Rennes. The rainy summer has prevented these trials being completed, but the commencement has succeeded very well.

" It is perhaps not altogether useless to give here an abridged exposition of the accidents that might be prevented, in changing the shape of ordinary hives, and of the means that might be employed for that purpose.

" It has been already said, that it is but too common to suffocate or drown the bees, at the end of the season, for the sake of profiting by the honey and wax. Those who manage them with more profit and intelligence, watch the time when the hives are nearly full, to force the bees up into an empty hive. This operation must be done in fine weather, in order that the bees may have time to make a sufficient provision for the winter. This practice, though the best of those in use at present, causes considerable loss; the brood-comb is taken away with the wax; so

that the proprietor loses a swarm just coming out, as well as the swarms that this one might have afterwards produced. It is this loss particularly that GELIEU would prevent.

" The hives at present on trial are, in shape, like a little round tower, or hollow cylinder, composed of four equal pieces, placed one above another."

" It is a certain fact, that the cells destined for the reception of eggs are always situated in the lower part of the hive, which is never disturbed. According to GELIEU's plan, it is only the storey above the hive that is taken, until after the brood-comb has furnished a swarm, and the swarm has taken flight.

" It seems, then, the interest of Rennes to patronize GELIEU's hives; they guard against the inconveniences of the methods now in use; and this has induced BOURDONAYE to adopt the means of making them of straw, in place of wood, like those of GELIEU.

" Monsieur DE LA BOURDONAYE's hives are a little higher priced than those in common use; but they give nearly a quarter more room, and

are, of course, more profitable in regard to price; they are in the proportion of five to eight.

" We shall soon be able to determine, with certainty, the advantages to be derived from this invention. MONTLUC has placed some joinings, such as BOURDONAYE has contrived, underneath his own hives, upon his estate of Laille. Similar ones, at different places in the faubourgs of Rennes, will furnish decided proofs of comparison.

" The preservation, and also the increase of bees, is an object of such interest to Brittany, that the peasants cannot be too much encouraged to turn their attention to it.

" The Society is well aware that it will be necessary to publish general instructions on that head, and that the greatest merit of such a work will be to give *only necessary* instructions, and nothing more. It must be made so simple and so cheap as to be within every one's reach, and, above all, applicable only to practical use. Any thing more is only fit for treatises wherein the authors are more occupied with the interests of their own self love, than with those of the public. But though much has been written on this sub

ject, the Society is of opinion that there are yet observations and experiments to be made before publishing a document by which all the world might profit."

On this long quotation, I shall merely take the liberty of remarking, that the only inconvenience ascribed to the storied hives, invented and made by my Father—the only objection made to them—is, that they are too dear, "that they will cost more than a louis each; a price infinitely beyond the reach of a labouring man." The price is high in Brittany, where wood is very dear. On the other hand, the model which my Father sent to REAUMUR, was made with a great deal of nicety, as a common one would not have been worth offering to that illustrious academician who sent him in return a very handsome thermometer, graduated by himself. My Father's hives, more simply wrought, were less expensive.

THE

BEE PRESERVER,

&c.

CHAPTER I.

SITUATION OF AN APIARY.

THE choice of a good situation is of the utmost consequence. An apiary will not thrive in a bad situation, however well it may be cared for in other respects.

1. The hives must, above all things, be sheltered from the wind. It is the first precept of VIRGIL *. For that purpose, the force of the wind must be broken, either by houses or by

* Principio sedes apibus statioque petenda,
Quo neque sit ventis aditus (nam pabula venti
Ferre domum prohibent).

VIRG. Georg. lib. iv.

lofty trees in the vicinity. A wall, however high, or a simple hedge, is not sufficient, because the bees that fly to the fields prefer stopping in places where the air is tranquil, near bushes, or along hedges or dells, where they find a much greater abundance of honey than in places exposed to gales of wind. They fatigue themselves flying from flower to flower, and still more returning to their dwelling, after having completed their little ladenings: with a rapid flight they get over a great extent of space, frequently against the wind; but, on approaching their hive, they slacken their speed, and advance, wheeling round and round, to recognize it. A mistake, at this time, might be fatal, and cost them their lives; and if, at this moment, they encounter a strong current of air, or a whirlwind, to repel them, they are again forced to wheel round to reconnoitre their habitation. After a hard struggle, the most vigorous arrive; the others fall, without power to rise again, especially when the air is cold, or the sky clouded. The ground will then be strewed with dying or dead bees, which never happens when the hives are placed in sheltered situations.

2*d*, The second condition of a good situation is its proximity to a fountain; or, still better, to a little brook, where the bees may drink *. Water is absolutely necessary, and enters as much as honey into the composition of the pap with which they nourish the brood; and the pollen or dust of flowers, which they bring home on their thighs, is also a very essential ingredient in this pap. The vicinity of deep waters is very hurtful to bees; and I have sometimes seen hundreds of them drowned attempting to drink out of a cistern.

If there is no small stream or fountain near them, they should be supplied by troughs, filled with moss, and then water poured on it, until they are as full as they can hold. The working bees come in swarms to them in the spring, and quench their thirst without risk.

3*d*, It is commonly believed that an apiary is not well situated unless it stands in the sun. This is an error; bees like the shade when working, and like the sun only when in the fields,

* "At liquidi fontes et stagna virentia musco
Adsint, et tenuis fugiens per gramina rivus."
Georg. l. iv.

which then animates and sustains them. For this reason, when people wish a swarm to settle, after it has left the hive, they hasten to cover it; because the shade induces them to rest, while a hot sun annoys them, and inclines them to take flight again. When we wish to disperse a cluster of bees off the front of a hive, we have only to expose it to the rays of the sun in the heat of the day. The bees then retreat under the hive, on the side, or behind it. They thrive well in thick forests, and delight in them; because there they find a uniform temperature and a propitious shade. How often, during the dog-days, have we not seen the honey running down, and the combs melting, in those hives exposed to the heat of the sun. In one hour, sometimes, a whole apiary will be destroyed. It is also a mistake to suppose hives exposed to the sun produce the earliest and strongest swarms. I have oftener than once experienced the reverse. My earliest swarms have generally come from the best shaded hives, and which only receive the sun late. I have even lost some in such situations, because they took flight sooner than we thought of watching them. We need never fear to shade a hive

since VIRGIL recommends it *. If the roof does not project sufficiently to protect the hive from the sun in the heat of the day, I would advise them to be shaded with deals or pieces of matting.

4th, The most favourable exposure is towards where the sun is from ten o'clock till mid-day. They should never be turned to the east or west, but, more especially to the north, where the cold and tempestuous winds would greatly injure them.

5th, Hives should not be placed high, on a first or second floor, as I have sometimes seen them, unless they be completely sheltered; because the wind is less powerful near the ground than in elevated situations.

* "Palmaque vestibulum aut ingens oleaster obumbret."
Georg. iv.

CHAPTER II.

PROPER TIME TO TRANSPORT A SWARM TO THE SITUATION DESIGNED FOR IT.

Most people who have bees allow their swarms to remain till the evening in the place where they have alighted, and do not move them to the apiary till after sunset. This method has many inconveniences, which have been already pointed out by a most judicious and experienced author. As soon as a swarm has congregated in the new hive, and seems to be at ease in it, the most industrious among the bees fly off to the fields, but with a great many precautions. They descend the front of the hive, and turn to every side, to examine it thoroughly; then take flight, and make some circles in the air, in order to reconnoitre their new abode: they do the same in returning.

If the swarm has taken flight in the morning, the same bees make several excursions during

the day, and each time with less precaution, as, becoming familiarized with their dwelling, they are less afraid of mistaking it; and thus, next morning, supposing themselves in the same place, they take wing without having observed where they have spent the night, and surprised, at their return, not to find the hive in the same place, they fly about all day in search of it, until they perish with fatigue and despair. Thus, many hundreds of the most industrious labourers are lost, and this may be entirely avoided, if the swarm be removed as soon as the bees are perceived coming out, with the precautions I have mentioned. This sign alone is sufficient. Sometimes I do not even wait until all the bees clustered in front, or on the sides of the hive, are re-united to their companions in the interior, as they are never long in being so; and this plan has always fully succeeded with me.

CHAPTER III.

SITUATION OF THE HIVES OUGHT NEVER TO BE CHANGED.

I HAVE seen people shift about their hives very inconsiderately, but change of place invariably weakens them, as the bees will return to their old residence, the environs of which are so familiar to them. A hive should remain as fixed to the spot as the ancient oaks, in the hollows of which they delight to establish themselves,—where they have their young, their companions, their beloved queen, and all their treasures. When the young bees take wing for the first time, they do it with great precaution, turning round and round, and fluttering about the entrance, to examine the hive well before taking flight. They do the same in returning, so that they may be easily distinguished, conducting themselves nearly after the same manner as the workers of a newly hived swarm.

When they have made a few hundred excursions, they set off without examining the locality, and, returning in full flight, will know their own hive in the midst of a hundred others. But if you change its place you perplex them, much the same as you would be if, during a short absence, some one lifted your house and placed it a mile off. The poor bees return loaded, and, seeking in vain for their habitation, either fall down and perish with fatigue, or throw themselves into the neighbouring hives, where they are speedily put to death.

The following fact proves how much these precious insects are attached to place, and how far they retain the recollection of it.

During my residence at Lignieres, where I passed twenty-seven years, I removed all my hives into the house towards the middle of November, to guard them from the drifted snow, in which my apiary would sometimes be buried, and I replaced them again some fine day in March. Having hives of wood and straw, of different sizes and shapes, I arranged them with more order and symmetry, and, with this view, I placed the first on the opposite side of the apiary to

where it formerly stood. Although it had been shut up nearly four months, the bees returned to the same place they had occupied the year before, which obliged me to return my hive with all speed, and led me to conclude that they should not be moved about, and that the bees will not be pliable to our fancies and caprices.

When hives are transported to a considerable distance, there is no fear that the bees will return. But this inconvenience would be sure to take place, and many of the working bees would perish, if they were removed only a few hundred paces from the spot they have been accustomed to. The hive may not perish, but it will be greatly weakened. In my opinion, if the situation is to be changed at all, they should be removed at least a mile and a half.

CHAPTER IV.

MOST CONVENIENT SHAPE OF HIVES.

One of the chief objects of my researches has been, to ascertain what shape of hive is the most profitable; and, with this view, I have tried all the different kinds in my apiary, and I have invariably remarked, that bees thrive better in low hives than in high ones; that, in general, those which are broad and flat, or extended horizontally, amass more honey, thrive better, and give out stronger and earlier swarms, than those which are high, and of several stories, and for the following reasons.

A hive thrives only in proportion to the success or perfection of its brood-comb. If the spring eggs come out well, the hive will stock, give out swarms at the proper time, and collect a great deal of honey, because the strength of its population will enable it to take advantage of fine days; while a weak hive will only give out late

swarms; and, having few labourers, will gather very little honey. It is, therefore, of great importance to assist the hive as much as possible, in the spring especially, when it is of itself too weak to keep up the necessary degree of heat for the hatching of the brood; and also, that in our climate there are frequently storms of frost and snow at that season, which are very prejudicial to it. If at that time the bees are lodged in high and roomy hives, they will crowd together in vain to procure the necessary degree of heat to vivify the brood-comb, which is always deposited in the middle of the hive, and the heat ascending is dissipated and lost in the empty space above. I have seen whole combs full of eggs do no good, in consequence of the want of heat. This never happens in the low, flat hives, where the heat is more easily concentrated; here, as the young bees come to life, the heat augments, and they assist in taking care of the others that are advancing, and begin to spread out on all sides, and entirely to fill the hive: the republic prospers, and increasing numbers are distinguished.

It is, perhaps, for this reason that bees thrive

well in conical or sugar-loaf shaped hives, which are common in some countries; but they have this disadvantage, that *capes* cannot be so easily fitted to them, which facilitate the collecting of the finest honey, and of which I shall treat presently.

CHAPTER V.

HIVES OF STRAW AND WOOD.

It is commonly supposed that bees thrive best in straw hives, because the straw absorbs the moisture, and the combs are less liable to mould. For my part, I can perceive no difference. The bees are careful enough to varnish over the interior of the straw hives with a coating of wax, or rather *propolis*, to prevent the settlement of the moths; and, in the old hives, this varnish is so thick that no moisture can penetrate between the cords of the straw. Wooden hives will also absorb moisture, to a certain extent; and experience has shewn me, that it is a matter of indifference

which are employed, except as to the price, according as either material may be more or less abundant in different parts of the country.

CHAPTER VI.

THICKNESS OR SOLIDITY OF HIVES.

WHATEVER may be the form or material of which hives are made, I strongly recommend not to be sparing of it, but to make them substantial. I would recommend that the boards of the wooden ones be an inch and a half thick; and that the straw-ropes of which the others are composed, be well twisted, and more than an inch in diameter. Such hives will be heavier and more unwieldy than thin hives, but they afford a better protection from the sun in summer, and the frost in winter. The heat of the sun is apt to melt the combs in summer: in winter the cold sometimes candies, and renders them useless; and, in the spring, the

thin hives neither retain the heat necessary for hatching the eggs, nor for preserving the honey in a liquid state. One may easily be convinced of this, by laying some folds of linen on the top of the hive, and then passing the hand between them, and there will be a degree of warmth felt, which never happens where the hives are thick enough. They may be a little more costly, but the expence is more than compensated by the prosperity of the bees.

CHAPTER VII.

SIZE OF THE APERTURE OR ENTRANCE OF HIVES.

It is of great importance to widen or contract the entrance, according to the season, or to the strength of the swarms; and for this purpose it is only necessary to have a few little wedges, or bits of wood, that may be taken out or put in at pleasure. Hives are weak in spring, because the bees are engaged in the interior, keeping warm,

and taking care of the young, and the guard at the door is not strong enough to prevent invaders. Contract the door, therefore, and four bees will defend it better than thirty would do, if it were more spacious, and enlarge it again by degrees, according to the increase of the population. The working bees must have room enough to go out and in without hinderance; when they begin to crowd together in groups at the entrance, it is a sign of the interior being filled, and they should then have free access, as they will be strong enough to resist pillage. When the cluster becomes very large, which it will do as the drones increase, enlarge the entrance as much as possible. It is even advisable sometimes to open the hive a little at the top, in order to moderate, by a current of air, the excessive heat that forces the bees to the outside; and this is the only case in which there is any advantage in lofty hives. After the destruction of the drones, the population diminishes, and the bees no longer cluster outside, and then is the time to begin, by degrees, to contract the entrance, in order to prevent plunder.

For this purpose, I use little wooden wedges

first, because they cost nothing, as any body may make them with a knife and a bit of stick; and, secondly, because they help to protect them from the moths, which make sad havoc when once they gain access to a hive. They deposit their eggs in the interstices between the wedges and the hives, and they are hatched by the heated vapour that is expelled by the constant vibration of the wings of the bees. In the fine weather of April or May, I inspect my hives twice or three times a-week, before the bees go out in the morning, take out the wedges, and scrape and clean them with my knife; and, in this way, I protect them from the moths.

CHAPTER VIII.

TO ASCERTAIN THE WEIGHT OF HIVES.

Many apiaries do not prosper, in consequence of the ignorance of those who have the care of them. How many people follow blindly the

way they have been used to, without knowing wherefore; others go on by chance, without rule or guide. At one time they ruin their hives, by depriving them of too much of their honey; at another, they suffer whole colonies to die of hunger, when they might save them by giving them food; and, in autumn, they suffocate those that appear to be destitute of provisions, because they know not how or in what manner to preserve them. Few amateurs understand thoroughly the state and wants of their hives, and generally estimate them by lifting them up to feel their weight; and, as this may be the cause of numerous mistakes, some being three or four times heavier than others, it is of the utmost importance to know the exact weight of each hive, when empty, without either combs or bees. For this purpose, I expressly recommend, that each hive be weighed before putting a swarm into it, and the weight noted down in a memorandum book, as well as on a ticket nailed on the hive, the use of which we shall soon see.

CHAPTER IX.

QUANTITY OF HONEY NECESSARY TO MAINTAIN A HIVE.

The quantity varies according to the climate. In southern countries, where there is scarcely any winter, the bees gather food till towards the end of autumn, and the flowers offer them pasture again very early in the spring. In these countries, therefore, they require a smaller winter store than in colder climates. The directions I am about to give, are only applicable to Switzerland, or to those countries which nearly resemble it in point of temperature. Every hive ought to have at least three pots of honey to nourish it during the winter; and, as the pot of honey, Neuchatel measure, weighs rather more than five pounds, of seventeen ounces to the pound, there should be fully fifteen pounds of honey allowed to each hive. Whether the swarm be strong or weak, large or small, is of no con-

sequence, as the smallest swarm will consume as much as a large one. If they have less than that allowance, they may linger through the winter, but will be sure to die if the spring happens to be a late one, and the weather cold and rainy. If a hive is expected to swarm, it should be allowed a quarter more in the autumn, that is, twenty pounds of honey: or it may be supplied after another manner, which I shall point out. But let there be no higgling with bees; better that they have too much than too little: more prudent than man, they never waste or abuse their superfluity.

In estimating the quantity of provisions that a hive contains, its age should be considered; and it is to be taken into account, that the black combs of old hives weigh ten times more than the white combs of a young one. It becomes, therefore, a matter of importance to know the weight of the empty hive, without which the quantity of provision cannot be estimated, and to weigh it again at the end of the honey season. When a swarm of the present year, at the end of autumn, weighs fifteen or sixteen pounds more than its original weight, I take nothing

from it, and I give it nothing, being certain that it can maintain itself, if not plundered. If it has twenty-five, or even thirty pounds, neither do I touch it, as it will prosper so much the better next year. As to old hives, they ought, at the beginning of winter, to weigh twenty-five pounds above their original weight. I willingly leave them thirty or thirty-six pounds. The remainder I consider my own, and of course take it away.

Some people will wonder at the quantity of provisions which I leave to my hives; but it is the true means, I may say the true secret, by which to insure swarms, for a starved one never produces. To this I have seen only one exception. I lavished honey upon a hive in spring, when it was crowded with bees, which were in want; this enabled it to give out a late swarm, but it never prospered. What surplus I bestow upon them, I consider as not lost, and that, sooner or later, it will return to me. Besides, the consumption is prodigious during the great *hatching* in the months of March, April, and May. It requires an incredible quantity to nourish the young in the state of *larvæ*, or worms.

The larvæ are involved in a kind of pap, which its nurses lavish upon it, and which is chiefly composed of honey. If, at this time, there should happen to be whole weeks of cold rainy weather, and high winds, which is sometimes the case at that season, the poor bees, unable to get to the fields, will suffer severely if they have not honey in store; the hatching is interrupted till the return of fine weather; and the population makes no progress: while, in well provisioned hives, it goes on without intermission. Bees are very saving; but it is to our profit. Let us not deal grudgingly with them.

Nevertheless, it is not advantageous to leave them greatly too much honey,—excessive superabundance annoys them. In plentiful seasons, I have seen middling sized straw-hives in which the combs were filled with honey down to the very boards. This happens especially when the bees have enriched themselves with plunder in the autumn; and there are two inconveniences attending it; first, the bees have not room to deposit their brood, which, by the time the swarms are ready to go off, fills the hive almost entirely; secondly, the old honey candies, and, in that

state, it is of no use to the bees. When hives are to be renewed by the cutting out of old combs, it is this kind that should, above all, be taken away. It is always to be found in old hives; and if it has been left several winters in the hive, it sours and contracts a disagreeable taste. The best use that can then be made of it is to dissolve it with more or less wine, and feed the bees with it on the approach of the swarming season; above all, when the weather is cold and rainy. Their activity is then increased by it.

These succours will not be found superfluous even when the trees are in flower. In fine weather they find honey in abundance on them; but, should a few rainy days interrupt their labours, and throw them upon their own resources, the progress of the hatching is stopped, and injury is done to all.

CHAPTER X.

THE USE OF CAPES OR HOODS.

Well made straw-hives ought to have a hole in the top, of about an inch or an inch and a half in diameter, which may be closed with a cork or stopper of wood. This stopper may be drawn out when it is found advisable to put a cape or hood on it, so as to give the bees more room to deposit their honey. These capes are little straw-hives capable of containing five or six pounds of honey-comb, or more, according to the size of the hive on which they are placed. They are made very thin and light: the cords of straw of which they are formed are very small, being not intended to keep in the heat, but merely to serve as a temporary magazine for the honey.

The use of these additions will be easily understood by those who know that it takes as long a time to hatch a bee as to hatch a chicken, viz. three weeks.

I have already said and repeated, that, in the swarming season, the strong and well provisioned hives are almost entirely filled with the brood-comb, and that scarcely any of the cells will be found empty. At that time also, honey becomes abundant; and, when fine days succeed each other, the working bees amass an astonishing quantity; but where is it to be stored? Moments are precious. Must they wait until the young bees have left the brood-cells, a week or perhaps a fortnight longer, by which time the early flowers will be cut down or withered, never more to display their honied cups to these little reapers? What is to be done in this dilemma? Must the young be sacrificed, and torn from the cells, in order to make room for the riches that nature offers on every hand? But this destruction of its posterity would ruin the colony. Mark, then, the resource of the industrious bees. They search in their neighbourhood for a place where they may deposit their honey until the young shall have left the comb in which they were hatched, and nourished, and undergone their metamorphoses; and, if they fail in their object, they crowd together on the front or

sides of their habitation, forming prodigious clusters. It is not uncommon to see them build combs on the outside; many did so in the year 1791, the finest honey year I have seen since 1753. In the year 1791, I drew from one of my straw-hives that did not swarm, seventy-two pounds of beautiful honey-comb, merely by emptying the capes as they were filled. All years, however, are not like that, nor any thing approaching to it. There are middling seasons, when the bees find little more than merely what is requisite for their own supply. There are also bad seasons, when almost all the swarms perish, as well as numberless old hives, when they do not receive assistance: such, among others, were the years 1812 and 1813. In the worst years there are days and even weeks of fine weather, when the honey is abundant; but it is of short continuance. The bees, however, at that time, will deposit their honey into the capes; and, towards the end of summer, or beginning of autumn, when little or no more is to be found, they remove it into the hive, filling the cells which the brood occupied at the time it was collected.

If, during the summer, we deprive them of this treasure, which is only deposited in the capes for the time, we impoverish them, unless it is returned to them in twice the quantity. This was one cause of the ruin and depopulation of so many apiaries during these two fatal years, and my principal motive for taking up my pen is, to prevent, if possible, the recurrence of such disasters, by making known to the public my observations and discoveries.

If the bees have room enough in the interior to dispose of their honey, it is needless to give them capes, for they will not build in them. These capes are commonly placed on the top of the hive, but it is matter of indifference whether they be on the right, on the left, or even underneath, provided there be an accessible way of communication between them. If we wish to attach them to the bottom of the hive, we establish a communication between the hive and the cape, by making a hole in the board on which the hive rests, so as to afford a free passage to the workers. I have capes of all kinds, above, below, and on the sides, which all succeed equally well. Those placed above have an advantage

not to be despised, which is, that they prevent the combs from moulding during the winter, an evil to which hives are liable in those countries where they are taken into the house, to protect them from the frost and snow.

All those that are well stocked, produce a moisture which, having no vent, collects in drops on the sides, and at the base of the hive, in which the bees are kept close prisoners until the return of fine weather. Many perish during their long captivity, and, oftener than once, I have found large icicles in strong hives. This never happens to those that have capes on the top; the moisture ascending evaporates through the opening, as by a chimney; and then one has the satisfaction of finding the combs healthy and free of mould in the spring. Care, however, must be had to cement it all round with clay or mortar, or some composition suited to exclude the wind, and to prevent the bees, sometimes very impatient, from getting out during the winter.

With this precaution, very few will be found dead in the spring; and, in well-stocked hives, the laying of eggs begins about the end of January or beginning of February.

Capes may be adapted to wooden hives, or to those of any other material, as well as to those of straw.

Many people place capes over all their swarms the very day, or the day after, their emigration, and I approve of this plan for early and strong swarms.

Capes neither prevent nor retard the issuing of swarms. I have frequently had hives that filled them, or were in the way of doing so, when the emigration took place, but on their numbers being diminished, stopped the work, and returned to it again as soon as they were reinforced, provided they did not give out a second swarm. Hives that have capes rarely give out second swarms, and this is no loss.

The honey obtained by the capes is very pure, beautifully white, and very superior to what is obtained by the cutting out of combs.

It sometimes happens, that the queen will ascend into the cape to deposite her eggs, when she has not room in the interior; therefore, should any brood-comb happen to be in it when it is intended to be removed, let it be replaced until such time as the young are completely hatched.

The brood-comb is easily distinguished: the cells that contain it have their covers darker, more raised, and much thicker, than those that contain honey, the covers of which are white, flat, and very thin.

There is no fixed rule for the time of removing the capes; it must altogether depend on the abundance of the honey. In six years, there are usually two bad, two good, and two middling seasons.

In bad seasons there is nothing to take away; on the contrary, some must be given, or, properly speaking, be *lent* to them, for the industrious bees always repay three, four, and five fold interest on the advances that are made them.

In good years, the capes may be emptied three or four times; and unless this be done the bees will build their combs on the outside.

In middling seasons, strong and well provisioned hives fill at least one cape, which may be taken without remorse, if they have not swarmed. I seldom or never take any from those that have swarmed, because they are thereby very much weakened. Good sense must here direct the proprietor.

The only fixed rule which can be laid down is, never to take the capes that are not quite filled, unless the hive happens to be very large, as there is always abundance of honey when the labourers determine to go to work in the capes. But beware of taking half-filled capes from small or middling sized hives: restitution will repair but a small portion of the evil this will do them.

CHAPTER XI.

HOW TO EXPEL THE BEES FROM THE CAPES.

It is in the heat of the day that the honey should be taken from the capes. A number of bees will always be found (commissioned no doubt) to guard the treasure.

Various methods are resorted to, to expel them without smoking. Some carry the cape to a distance from the apiary, turn it upside down, rest it on the ground, and cover it with a napkin, leaving on one side a space of about a finger-length uncovered, to allow an exit to the bees,

which, escaping by this opening, return to their habitation; and, to hasten their departure, some one knocks, from time to time, on the outside.

Others take a cape of the same size, place it over the full one that is turned upside down, bind them round with a napkin, to intercept all passage to the bees, and force them to ascend into the empty cape by tapping gently on the full one. They soon go up into the empty cape, calling on each other, and flapping their wings; and, when they are all housed, replace them again on the parent hive whence they were withdrawn; and, if the season is favourable and the honey abundant, they soon set to work again.

I prefer this last method, which is the speediest and easiest.

CHAPTER XII.

SIZE OF HIVES.

Most amateurs have all their hives of an equal size. Some will have only very large ones;

others very small ones; and others there are who prefer those of middling dimensions, into which they lodge indifferently, early and late, weak and strong, and even double swarms, that have re-united on leaving the parent hive; this is not very judicious. There should be a roomy lodging for first and for strong swarms, and even more so for double ones; and there ought to be small hives to receive feeble and tardy swarms, as well as for second and third ones at least, if proprietors do not reinforce them, by uniting them, according to my plan. Middling sized hives are convenient for ordinary swarms, which are neither the first nor the last ones.

When two or even three swarms come off at the same time and mingle together, as sometimes happens in large apiaries, I take care not to separate them, but give them a hive big enough to contain them all.

One strong population supports itself better, and is incomparably more profitable, than feeble colonies, that must be often in need of assistance. But there is a measure in every thing, and there should be no excess; should four or five swarms mingle, it is proper to separate them and lodge

them in two hives of suitable dimensions; when I have not done so, I have always, except once, had cause to regret it. Before swarming time, it is as well to prepare hives of various sizes, just as one would have casks ready in a cellar before the vintage, to be ready for use. Here experience is in harmony with reason.

CHAPTER XIII.

MANNER OF UNITING NEW SWARMS.

Feeble and tardy swarms can do no good excepting in very fine seasons. In bad seasons they greatly weaken the hives that produce them, without being able to shift for themselves. In ordinary years, they can only be preserved by much care, and at the expence of a great deal of honey; and most of them die, after all, without bringing any profit to their master. I have saved some that have turned out well, but only at the end of two or even three years; and I ad-

vise no one to try the experiment unless they have a great deal of honey to spare. It is better to unite them, and proceed after the following method:—

When two small swarms come off the same day, I gather them separately, and leave them at the foot of the tree or bush on which they have alighted. Towards evening I spread a table-cloth on the ground, on which, by a smart and sudden movement, I shake all the bees out of one of the hives, and immediately take the other and place it gently over the bees that are heaped together on the cloth, and they instantly ascend into it, flapping their wings, and join those which, not having been disturbed, are quiet in their new abode. Early next morning I remove this newly united hive to the place it is destined to occupy. This doubled population works with double success, and in the most perfect harmony; and generally becomes a powerful colony, from which a great profit is derived. Two feeble swarms may be united after the same manner, although one of them may have come off some days later than the other, and the first may have constructed combs; taking care, however,

not to make the first one enter the second, but the second the first, as the bees will ascend more readily to join those that have already begun to make honey and to hatch brood; and next day they will proceed together, with increased ardour, with the work which the first had already begun, and which will now advance more rapidly from the increase of the labourers. It is to be understood, that, after this union, the hive should be placed early next morning in the same place where the oldest of the swarms has already passed some days.

I have recommended the uniting of swarms to be effected in the evening, when the bees are quietly housed for the night. If it were to be during the day, when the labourers are in full activity, they might fight and kill one another, to the total destruction of one of the swarms, which I have seen happen more than once. But in the evening they are grouped together; those that have been displaced alight upon, and take hold of, the others, and thus merely extend the cluster, now composed of two distinct masses, the one covering the other: their peace is never disturbed, and next day they work together in

perfect harmony. Their fighting is always after the fashion of a duel, and not of a battle. In their wars, they do not range themselves in close battle lines, like men, breaking through and overturning each other; they fight bee to bee, excepting in cases of plunder or the killing of the drones, and then the combatant who first engages in the attack is speedily assisted by all those within reach uniting their forces to overthrow the enemy. But when the whole of a new swarm, suddenly displaced, ascends precipitately into a hive, peaceably occupied by another, the bees of each colony cannot recognize each other, and having no field to fight after their own fashion, they pass the night together, and, doubtless, acquiring the same smell, live happily together. But such is not the case when we wish to make a swarm enter an old hive, or to unite it to one whose hive is already full of honeycombs. Then another way of proceeding, and precautions of another kind, are necessary, concerning which I shall now give directions.

CHAPTER XIV.

METHODS OF UNITING TWO OR THREE SWARMS IN AUTUMN.

When the swarms have not been able to lay up a sufficient provision during the fine weather, I weigh them at the end of the season, and, knowing the weight of each empty hive, I can tell exactly the quantity of honey they have in store.

If they are three, four, five or six pounds too light, I preserve them, and feed them in the manner I am about to detail. When the swarms have only about one-third or one-half of the quantity of honey which would suffice to feed them, I might keep them alive by giving them as much more as they require. I have frequently done so; but I have already remarked, that this plan costs too much honey, and gives too much trouble; and therefore I generally join them into one. For this purpose, I leave the

heaviest swarm untouched, and, in the morning of a fine day in September, or beginning of October, I commence by blowing a few whiffs of tobacco-smoke with my pipe in at the door of the hive of the lightest swarm, to disperse the sentinels; then, turning up the hive, and placing it on its top on the ground, I give it a little more smoke, to prevent the bees from becoming irritated, and to force them to retire within the combs. I proceed to cut out all the combs in succession, beginning with the smallest, sweeping the bees with a feather off each piece back into the hive; and then I place the combs, one after another, into a large dish beside me, keeping it, at the same time, carefully covered over with a napkin or small table-cloth, to prevent the bees returning to their combs, or the smell of the honey attracting others that may be flying about. The last comb is the most difficult to come at, being completely covered over with bees. I detach it, however, in the same way as the others, but with greater precaution, sweeping the bees off very gently with the feather until there is not one left on it. This operation I perform without gloves or any other protection,

armed only with my pipe; and, for ten times that I treat them after this fashion, I seldom receive one sting, even when I act unassisted.

The combs being all removed, the swarm remains as completely destitute of food as it was on the day of its emigration, and I replace it on its board in the same spot it occupied when full, and leave it till the evening, by which time the bees will be clustered together like a new swarm. During the whole of the day, which I shall suppose to be fine, they occupy themselves with great earnestness cleaning their house, and making such a noise in removing the little fragments of wax that have fallen on the board, that any one who did not know it had been emptied, would take it for the best and strongest of the hives. Before night, when they are all quiet, I throw a few whiffs of smoke in at the door of the hive which I mean my deprived swarm to enter, and which should be its next neighbour, on the right hand or the left; then, turning it up and resting it on the ground, I sprinkle it all over with honey, especially between the combs where I perceive the greatest number of bees: five or six table-spoonfuls generally suffice; at

other times three or four times as many are required. If too little were given, the new comers might not be well received; there might be some fighting; and, by giving too much, we run the risk of drowning them. One should cease the sprinkling when the bees begin to climb up above the combs, and shelter themselves on the sides of the hive: this done, I replace the hive on its board, which should jut out about seven or eight inches, raising the hive up in front with two little bits of stick, so as to leave a division of an inch in front between it and the board, to give free access to the bees. I also spread a table-cloth on the ground before it, raising and fixing one end of it on the board, by means of the two bits of sticks that are placed as a temporary support to the hive. I then take the hive that was deprived of its combs in the morning, and, with one shake, throw the bees out of it upon the table-cloth, which they instantly begin to ascend; while, by the help of a long wooden spoon, I guide them to the door of the one that is placed for their reception. A few spoonfuls of the bees raised and laid down at the door of the hive, will set the example,—they enter at

once, and the others follow quickly, flapping their wings and sipping with delight the drops of honey that come in their way, or officiously licking and cleaning those first inhabitants that have received the sprinkling, and with whom they mingle and live henceforth on good terms. One division of the new comers always clusters on the front of the hive, which they enter during the night without disturbance, much pleased to rejoin their companions. Next morning early it is necessary to take away the table-cloth and the bits of stick that were placed to raise up the hive and facilitate the entrance of the bees, and for some days the door should be left as wide as possible. The hive should also be moved a little to the right or left, that it may stand precisely in the centre of the place they both occupied before the union.

I have frequently united three swarms in the same manner, and with the same success, taking care only to empty in the morning those on each side, and to make the bees enter the middle one in the evening, after it has been sprinkled with honey. In this case I do not remove the one that unites the three swarms. The reason of this we shall soon see.

CHAPTER XV.

MANNER OF UNITING OLD HIVES IN AUTUMN.

When old hives are weakened by giving out too many swarms, and have not amassed a sufficient provision for the winter, many proprietors place them one above another, simply making an opening in the board, to serve as a communication between them, and closing the entrance to the upper one, with a little clay, for the purpose of making the bees go out and in through the lower one by the only opening that is left them. Several authors advise it; I have done it also, but shall do so no more, having found it attended by two serious inconveniences.

The first is, that the two colonies do not always agree; indeed they fight sometimes to extremity, and thus the one is destroyed and the other is weakened. The reason is, that the bees of the upper hive, descending one by one, or only few at a time, are examined at leisure by those

in the lower one, and, not having the same signal, are mistaken for robbers, and killed without mercy. This occurred to me the first time I attempted to unite them in this way; but it never happens in the tumultuous union of two swarms, when the one has been sprinkled and almost glued with honey, in consequence of which it is not in a fit state to commence an attack on those that are hastily displaced.

A second inconvenience is, that, even supposing there should be no warfare, the habitation is much too large for those that are henceforth intended to be but one family. Whether they unite in the upper or the under hive, one of them must be left empty, into which thieves can find easier access; and although they should not be plundered, they would suffer from the cold of a severe winter. The population, indeed, is doubled, but so is the size of the lodging, and in that case there will be no swarms. Very large hives seldom swarm, it requires so much more time to fill them. My method has not these disadvantages, for two families living together in the same hive are warmer, and better able to resist any hostile attack.

It is to avoid these two inconveniences that, in autumn, I empty an old hive which has not sufficient provision, and, in the evening of the same day, I introduce the bees into one of its neighbours on the right hand or on the left, proceeding in the same manner as with the swarms; with this single difference, that the sprinkling of honey should be more liberal to the old hive than to the swarm.

If the hive of which I have doubled the population is well enough furnished with provision for the winter, I give it nothing. And if there is not enough, I give it before winter as much as it requires, in the manner hereafter to be detailed.

CHAPTER XVI.

NEIGHBOURING HIVES SHOULD BE UNITED.

I HAVE already said, in Chapter III. that bees which have not swarmed voluntarily return to

the place they have been accustomed to, even after having been shut up for months: the same thing would happen if you united swarms distant from each other. Next day, or the day after, you would have the mortification to see the bees return by hundreds to their old residence, flutter about for a length of time, and lose their lives, either by falling down from fatigue, or throwing themselves into the neighbouring hives, where they are put to death. Not having left their new dwelling with the same precaution that a swarm uses to reconnoitre the one it has chosen, or that has been given to it, and, supposing themselves at home, in spite of the disorder of the night before, they rush out on a rapid flight, and, returning from their excursion, go back to the place of their ancient domicil; and thus the purpose of fortifying your hives, and of preserving them, by uniting them, is defeated. I have frequently tried to unite distant hives, and always met with this result.

There is only one remedy for this that I know of, but it is an imperfect one, and gives a great deal of trouble. It is, to put in some combs of wax into the hive that has been emptied, and re-

place it in its old situation. The bees return to it in great numbers the following day, and some days after; at length, after a great deal of bustle, they settle towards evening on the combs, and, before night, when they are quite tranquil, I take the combs one after another, and, with a feather, sweep off the bees, so as to make them fall upon the board of the one that contains their companions, and which they now enter with evident marks of joy. This operation may require to be repeated for seven or eight days, with this difference, that every succeeding day fewer will return. Thus the evil may be repaired, though incompletely and with infinite trouble.

It is to avoid the perplexity which displacing them occasions to these precious insects, and also the loss that results to myself, that I move the united hive a little to one side, so that it may occupy the space that was before between them. As displacing them only a few inches does not confuse them, for the same reason, when I join three hives, as I often do, I never displace the middle one, but remove those I have emptied on the right hand and on the left, which is sufficient to prevent mistakes, and the bees, finding

no hive on either side, enter the middle one without hesitation. It is a very essential point, however, to join only neighbouring hives, as being less troublesome and more successful.

It would be a good plan to mingle in the apiary strong and weak hives alternately, and to place small and late swarms near each other, in order to unite two and two, or three and three, in autumn, if they have not enough of provision laid up for their winter subsistence.

When a deprived swarm happens not to be near another in the same state, there is nothing to hinder it being united to any old well provisioned hive that may be near it, as it will thrive all the better for such an addition to its population. I have done so oftener than once, and always with success.

CHAPTER XVII.

HOW TO FEED UNITED SWARMS.

THERE is always honey in hives that are emptied to be united. If there are six pounds more or less, I lay aside the combs that are full, after having separated those that are but half filled, and of which the cells are not hermetically sealed by the little thin chip of transparent white wax which invariably covers those cells that are full of honey. Twelve or fourteen days after the union, when the cold forces the bees to congregate themselves in their hives, I give the hive that contains the double population a few puffs of tobacco-smoke; then, turning it upside down, I cut away the empty combs, that are always below and on the sides of the hive. While performing this operation, it is necessary to give them an occasional whiff of smoke to keep them quiet. I only take out the one-half of those that are half filled with honey, and cease as soon as

I find the comb quite full. When there is room enough to contain the fragments of honey-comb that I mean to put in, I place them as nicely as I can, without breaking or bruising them, filling the empty space, without leaving any division but the little intervals between the combs, to allow a free passage to the bees. This done, I lay a board over it, and, with the aid of another person, we return it gently to its former position, and, shaking it as little as possible, replace it in its proper situation.

This operation may be done in the morning or in the evening, but never in the heat of the day. I prefer the evening, in order not to attract thieves.

The diligent bees soon discover the change that has taken place; and finding bits of honey-comb heaped up in all directions, they set about giving them solidity, soldering them together before the following night, in such a manner, that all these fragments soon form one mass, intersected only by little alleys of communication. Thus it remains during the whole of the winter; and, in the month of March or April, according to the temperature of the weather, I take out

this irregular mass, which I find entirely emptied; the bees having lived upon it, and spared the provisions which they had stored in the middle of the hive.

I have supposed that the hive whose population I have doubled has also received the addition of six pounds of honey-comb, given in the way I have just described. These constitute, as it were, the dowry of the new comers, who are themselves at the whole expence, as it was they who constructed and filled the combs of which I took possession. The doubled hive having then sufficient food to subsist on till spring, I trouble it no more, certain, from past experience, that I shall then find it in good condition. Every one of these swarms would have perished from want, had they lived separately; and, by joining, I give them the means of subsistence, without costing myself any thing. If the supposed six pounds do not suffice to support them, I lend them more; I say *lend*, for the bees always return with interest whatever advances are made to them.

I proceed exactly after the same manner when I unite two old hives that have not been able to

lay up a sufficient provision, remembering always, as already mentioned, that old dark-coloured combs, being much heavier than white ones, contain also less honey, and that, consequently, it requires a greater number of pounds to make up a pot of this nectar. The difference is so great, that six pounds of white comb will produce more than a pot of honey, whereas the same quantity can scarcely be extracted from eight, or even ten, pounds of black comb.

CHAPTER XVIII.

QUANTITY OF FOOD REQUISITE FOR UNITED HIVES.

I HAVE said, in Chapter IX. that each hive must have three pots, or fifteen pounds of honey, to sustain it during the winter, and until the bees can find food for themselves again in the spring. For this reason, I have advised the empty hives to be weighed, before the swarm is admitted into

it, and again in the autumn, when the honey season is over, in order that we may be assured that there is food enough to maintain them during the winter.

In doubling the population, I naturally expected that we must also double the quantity of food, for I had always seen that two or three families, living together, used more meat than each would have done singly, however rigid their economy. The more mouths the more meat, thought I; and, in consequence, I augmented greatly the amount of provision the first time I doubled a hive; but, to my great astonishment, when I weighed it again in the spring, I found that the united swarm had not consumed more than each would have done singly. I could not believe my eyes, but thought there must be some mistake, nor could I be convinced, until I had repeated the experiment a hundred times over, and had always the same result.

I have made a point, in every instance, to mention the reasons of my advice and proceedings; here, however, I humbly confess my inability to do so, nor can I conceive how an army of thirty thousand troops could be served with the same

rations allowed for an army of only ten thousand, supposing the soldiers of both to have an equal appetite, and to have each wherewith to satisfy it. But the fact exists in regard to the bees; any one may have it in his power to convince himself of it; the cause is to me unknown, and must be left to wiser heads than mine to explain. Does the increase of heat supply, to a certain extent, the place of nourishment? Does the greater and more uniform heat, in a well-stocked hive, make the food more nourishing?

These are questions which I propose to naturalists, but which I cannot answer.

After this discovery, as important as it seems to be inexplicable, I varied my experiments, not only to convince myself of the fact, but, if possible, to arrive at more extended results. I joined three hives in the autumn, by introducing into the middle one, the bees of two neighbouring hives; and I found, on weighing it in the spring, that its inhabitants had scarcely used one pound more than those of hives that had not been united. I went farther: Having a large well-stocked and amply provided hive, I added to it, in the autumn, without displacing it, the swarms of four

neighbouring hives, two on the right hand and two on the left, that were so scarce of provisions that the quantity of honey that would have been necessary to have kept them alive, would have far exceeded their value, and that all the four would, to a certainty, have perished. This enormous population produced a heat so great, that, during the whole of a very severe winter, the bees kept up a buzzing noise equal to that of a strong and active hive in the evening of a fine day in spring. The steam expelled by the vibration of their wings, collected in drops at the door, and formed icicles round the entrance of the hive during severe frost. The hive was left out all the winter, and would infallibly have perished had I shut it up; and what was my astonishment, on weighing it in the spring, to find that, notwithstanding that it contained five pounds, the total diminution did not exceed three pounds more than took place in my ordinary hives. It gave out excellent swarms, long before any of the others, and recompensed me well for my pains. I have not repeated the experiment to the same extent, but have limited myself

to the union of two, or at most three deprived hives, and have been very well paid.

What, in these circumstances, becomes of the supernumerary queens, since their hatred to one another is so great that there can be but one in each colony? I give myself no trouble to answer the question, more curious than useful; the aim of my experiments being only to give practical rules.

I have often been astonished that so important a discovery should not have been made sooner by some of the superior minds that have taken an interest in this branch of rural economy; and that, in the course of their researches, not one of them should have thought of uniting two or three weak swarms, before winter, to compare them with single swarms, in order to ascertain how much honey was necessary, according to both plans, till the end of the winter season. Doubtless they had believed, as I formerly did, that the more numerous the family the more provisions would they require, and that little would thus be gained by uniting them. I should have regretted quitting the world before publishing this discovery; and it had nearly perished with

me; for, continued and indispensable occupations, as well as a dangerous illness, prevented me setting about giving it to the public, till now that I am far advanced in life.

CHAPTER XIX.

BENEFITS RESULTING FROM THE UNION OF WEAK HIVES.

THE advantages of uniting weak hives are very considerable. I need only mention three. 1. The bees are saved; 2. They are saved without trouble or expence; 3. All the hives are strong.

The first of these advantages is the preservation of the bees. In every country, swarms are destroyed that have not been able to gather a sufficient store of provision. Those found to be too light are unmercifully condemned to be suffocated; and what little honey they have collect-

ed, is considered as pure gain, because the bees would have perished from want, after having consumed the scanty fruits of their own industry; and, by putting them to death a little sooner, something at least may be made of them. Thus people reason, and thus the murderous practice is so generally adopted. The same plan is followed in regard to old hives that are exhausted by giving out too many swarms; and in short, to all those that have not abundance of provision laid up; and the very heavy ones, on the other hand, have their bees slain to get possession of the honey. What a frightful proscription is this! What blanks occur in the apiaries, especially in bad years, such as 1812 and 1813! And how injurious to our own interest is this indiscriminate destruction of weak and healthy, of rich and poor! There is no mercy shewn but to them that have just enough to keep them alive; and not even one of them would be spared, were they not indispensably necessary to repeople the apiaries by new swarms. According to my method, all these evils are prevented. All the hives may be robbed of their treasures; but the lives of the bees are spared.

A second and very considerable advantage is the saving of honey. I have already said, that there must be at least three pots or fifteen pounds of honey to maintain one hive, whether it be strong or weak. If three swarms, then, have only that quantity among them, each has but a third of the provision that it requires; and, to keep them alive, you must sacrifice six pots of honey, that is, two-thirds of the whole provision, or two pots for each. It is to avoid this great expence, which would equal if not exceed the value of the swarms, that most people have recourse to the prompt measure of suffocation. But, by uniting the swarms, all the working bees may be saved, without any expence, and without any waste of honey but the small quantity employed to sprinkle the combs of the hive, into which you make them enter. The honey-combs found in those which you empty, are sufficient to feed the three united swarms, by giving it to them after the manner I have directed at page 33. The wax is all your own. It costs only a little care and a little trouble, which will be amply repaid by the benefit insured. And

will it be accounted a slight pleasure to witness the prosperity of the bees we have saved?

A third advantage, which appears to me one of great value, is, that all the hives which we possess are strong hives (meaning by the term strong, such hives as are well stocked with bees). Weak hives decline and yield nothing; have frequent need of assistance; are exposed to pillage; give out no swarms; and produce scarcely heat sufficient to hatch a little brood in a corner of their dwelling, which never comes to good. How often have I seen the brood come to an untimely end. In vain the bees will crowd together, to procure the necessary degree of heat, when there is much empty space in the hive. A number of weak hives may do well enough to make a shew in the apiary, but will be no profit to the proprietor. It costs a good deal to feed them, if one would keep them alive; and there is very little to be gained by putting them to death. Not so with the united hives; they were all vigorous; in condition to defy the rigour of the seasons; to repel their enemies; and to gather a great quantity of honey. The population augments rapidly, and they give out early swarms; or if some

of them do not produce swarms, they furnish so much the more wax and honey, and will collect more in one day than weak hives will do in a whole week; in short, there is no comparison between them.

CHAPTER XX.

TIME AND MANNER OF RENEWING OLD HIVES.

It is a common prejudice, that hives cannot be profitably preserved beyond three, four, or six years at most, and that, beyond that term, they become weak, give out no more swarms, and finish by being pillaged, or becoming the prey of moths, which, if suffered to establish themselves, soon make horrible devastation among them. A great many experiments, however, have fully convinced me that such is not the case, and that the duration of the hives may be greatly prolonged by renewing them.

I have several from twelve to twenty years

old, that are as prosperous, and swarm as well, as the young ones. I have even one of June 1789, consequently now in its twenty-fifth year, and it gave off an excellent swarm on the 4th of June 1811, the same in 1813, then aged twenty-four years, and again another this year 1814. Besides these numerous swarms, I have taken from it 142 pounds of honey-comb, either by pruning, or by means of capes. I have never united it with other bees, because its neighbours had always enough to subsist on, and I have renewed it only once.

The decay of old hives proceeds from three causes. The first is the candying of the old honey, of which the bees have sometimes an ample store, but which, from inability to eat it, becomes in that state very troublesome, in place of being of use to them. When forced by hunger to have recourse to it, they draw it out of the cells, and throw it down on the board that serves as a floor to their habitation, in order to profit by any of the sweet drops that happen to be in a liquid state. In nibbling and scraping to empty the cells, it happens that many of them become so daubed, that, being unable to get away from it,

they fall down, and soon perish, if the weather is cold. Thus the old honey is lost as much to the proprietors as to the labourers that have gathered it. Supposing, again, that they do not touch it, the place it occupies is lost either for the purpose of depositing new honey or brood, and hence the weak state the hives fall into, if not renewed.

A second cause of their decay is owing to the great quantity of the pollen or dust of flowers that the bees gather and carry home on their legs, especially in the spring and autumn, when large portions of the combs will be found filled with it on both sides. It is an essential ingredient in the pap with which they nourish the young brood, but good for nothing else. Different authors have named it *bee-bread;* but the bees never eat it: indeed it is a well attested fact, that they will die of hunger on the combs that are filled with it. As it is very heavy, it sometimes cheats those people who estimate the provision of a hive by its weight. This is one of the reasons why I have recommended, in Chap. IX. to allow eight or ten pounds more to old hives than to new swarms.

The bee-bread being generally, when present, deposited in the centre of the combs, where the brood thrives best, of course the place which it takes up is so much lost. It is liable to mould in winter, and the working bees have a great deal of trouble in tearing it from the cells, and putting it out of their way. It spoils the honey, takes away its whiteness, and gives it an unpleasant taste; it destroys the wax even more, and forms that brown scum under the cakes, when great care is not taken to separate it. Nevertheless, bees lay up useless hoards of it, which they go on augmenting every year: and this is the only point on which they can be accused of a want of that prudence and foresight so admirable in every other respect. By renovating the hives, one frees them of this superfluous substance, and the space it occupied is directly replaced by beautiful white combs, and the whole hive becomes as good as new.

A third cause of the weakness of an old hive is the blackness of the combs in the centre and front of the hive. These old combs are mostly pierced with holes large enough to hold two or three fingers, or even a whole hand. They are

not openings which the bees have cut out for themselves, to pass from one comb to another; but are the result of some violent measure to which they have had recourse, for the purpose of defending themselves from the moths, one of which, establishing itself in a comb, will soon destroy the whole hive, if they do not speedily rid themselves of it. The young moth is not so easily got the better of, being cased in a sort of strong silk, by means of which it forms galleries, and slides from side to side of the hive; and the bees are unable either to get within reach of the enemy, or to rend this silken covering that defends it; but, perceiving their danger, they join together in forming a plan of attack for their deliverance, by gnawing the comb in which the moth is established, as far as the galleries extend; throw down the piece, and finish by reducing it to crumbs, and never rest until they kill the foe. They require to be in great force for this operation. Weak hives need not attempt it; indeed they generally finish by becoming the prey of the moths.

It is singular that bees, which know so well how to build combs, should not be able to repair

them. I have found as many as six of these holes in one comb. Are they left standing thus, like so many monuments of victories gained over a formidable enemy,—the most formidable and the most difficult to conquer? All useless combs should be taken away, as they tend to weaken the hive, and they will soon be replaced by entire and healthy ones.

CHAPTER XXI.

THE SIGNS BY WHICH TO ASCERTAIN WHETHER A HIVE REQUIRES TO BE RENEWED.

As long as a hive produces honey and swarms, it is needless to touch it; but, when it ceases to be productive,—when, during several months, the bees form clusters, without swarming, I then think it necessary to renew, or, properly speaking, to prune it; the directions for which will be best understood by my simply relating how I managed my two first experiments.

The first time I performed this operation was on a pretty large-sized straw-hive, which, for ten years, was very productive. One year alone, it yielded me seventy-two pounds of very fine honey-comb in the capes, mentioned in Chapter X. The eleventh and twelfth years it made me no return, though it was heavy and very populous. About the beginning of the thirteenth year, I gave it a little tobacco-smoke, with my pipe, and proceeded to prune the combs away with my knife, until I came to brood. There remained only four in front, in which the bees always begin to lay their eggs in the spring. They were very black, and contained little honey, but I saved them, that the population might not be destroyed. The honey that I took out was hard and candied, but I melted it with a little wine; and, filling some bits of empty combs with it, gave them a part of it two or three times a-week, being careful to place them in the hive in the evening, and take them out again in the morning, for fear of attracting thieves.

I thus fed the bees with their own store; the combs were always empty in the morning. By the month of April, they began to build in the

space I had left. By the middle of May, they had completely filled it with beautiful white combs, like those of a new swarm; and the same year, on the 9th of June, it gave me, contrary to my expectation, an excellent swarm. Next year, by the end of March, I took away the four black combs that I had left, and in which was no brood. The brood was by this time deposited in the middle combs; thus my hive was completely renewed.

Encouraged by this success, I performed the same operation next spring, on a common sized hive, which, during eleven years, had annually yielded me honey or swarms: one year I took from it forty pounds of beautiful honey-comb; but, for two years, it had been languid and unproductive. On the 4th of March, I pruned away all the combs, excepting two in front, containing brood; and I nourished the bees, by giving them a little of the liquid honey every evening, upon a bit of comb, until they could get out to gather food for themselves.

In the month of May, all the combs that I had cut out were replaced with the most beautiful new ones. This hive, which was weaker than

the other, gave out no swarm the same year, but it filled a cape with some pounds of honey-comb, which I took possession of.

The following year, on the 4th of March, I cut away the two black combs that were left in front, and thus this hive was also entirely renewed; after which it produced me four swarms, and nearly forty pounds of honey-combs in the capes: this I consider a clear profit, there not being the smallest doubt that the hive would have perished, had it not been renewed.

These two examples may suffice to shew the advantage to be derived from the renewing of old hives. What would mine have yielded had I resorted to the common method of suffocating the bees? A little indifferent honey; for that of candied combs is very inferior to that of new ones. As to the wax, I should have had no more, since I took away all that the hives contained, and the exchange gave me good strong colonies, which are more valuable than the best swarms.

The advantage of my plan will be better understood, if we shall suppose two neighbouring apiaries, equally good, and in all respects equally

well taken care of. Suppose one of them shall be managed in the ordinary way, and that, every year, the owners shall suffocate the heaviest swarms for the sake of the honey, and that they also destroy the old hives that have too little provision for the winter. Let the other apiary be managed according to the principles I have detailed, that not one bee shall be put to death, and that, in the autumn, the swarms that are too light, as well as the old hives that are scarce of food, shall be united, and that the latter shall be renewed when they cease to prosper.

At the end of fifteen years, compare these two apiaries, and see which has the strongest hives, the greatest number, and in the best condition. It would be surprising indeed, if they preserved their original equality.

Will these operations be objected to, on account of the difficulties attending the performance of them? Will it be said that every one has not the courage to run the risk of being stung, or the dexterity to set about handling the bees?

In all countries there are people to be found who are accustomed to gather swarms, and to put joinings on hives. Let them be employed,

and directed in every part of the work that the proprietors do not like to perform themselves. This practice is common in Lusatia, a country celebrated in the history of bees, by the very useful discoveries of M. SHIRACH, and where they make annually, according to his principles, a great quantity of artificial swarms. The country people, of whom the greater number understand nothing of these complex operations, which take more time, and are much more difficult than the union of swarms, or the renewing of hives, employ people who are bred to the business, and who, in the proper season, go from village to village, making swarms, and are paid for their trouble.

From the result of my experiments, it is evident that the duration of hives is indefinite; and here a multitude of questions present themselves. How long does a queen live? Would she live twenty years and more? Is the term of her existence prolonged beyond that of the working bees? I cannot answer; but I have reason to think that bees live only one year, and that those which have lived over the winter, and have assisted at the work during the spring and sum-

mer, and which do not perish by accident, die of age in the month of August. By that time, they seem to become paralytic; and, unable to fly, they fall down in the neighbourhood of the hives, and creep about until they expire from fatigue and exhaustion.

One then sees many of them, with their wings fringed, which is a sign of decrepitude, similar to the wrinkles of an old person; while the young bees may be discerned by their grey ashy colour, which becomes darker, approaching to black, as they get older. I do not believe that the queen (on whose existence depends that of the colony), lives ten, fifteen, or twenty times longer than the working bees. But they have the means of filling her place when she comes to die. M. Shirach has completely demonstrated, by very varied and multiplied experiments, that they require only for that purpose a common bee-worm that has been hatched within two or three days, and that this worm becomes a queen, and a fruitful queen, in less than a fortnight, by means of a thicker, more roomy, and differently formed cell, which they construct expressly for her, and by a different sort of pap with which she is

nourished. I have repeated the experiment oftener than once.

Forty days after I had put a bit of brood-comb into a wired box, after the manner of M. SHIRACH, I saw young bees come out; and the young queen I had made be hatched, was the mother of my artificial swarm. It is therefore probable that a hive, from twenty to twenty-five years old, has not always the same queen, but that the queen has, from time to time, been replaced. Moreover, every time that a swarm comes off, it is the old queen that emigrates with it.

The sudden decline of a hive that has lost its queen, and which never long survives the loss, when it has not young brood to create another, proves that bees live but one year, as the depopulation would be less rapid if the lives of the individuals extended beyond that term.

CHAPTER XXII.

ARTIFICIAL SWARMS AND DIFFERENT METHODS OF FORMING THEM.

One often sees well-stocked hives that do not swarm, and which, during the whole of the summer, form large clusters, until the cold of the autumnal evenings forces the idlers to re-enter their hives; and it were vain to disturb them, to smoke them, or torment them, in the hope of forcing them to swarm. Some people have thought they might attain their object by dividing them in two; but they did not succeed. There are, however, two ways of obtaining artificial swarms; and the one which the celebrated Shirach practised successfully in Alsatia, and which was followed with the same results in the north of Germany, requires a long course of difficult and complex operations. I shall, however, proceed to give my readers some idea of it.

In spring, a little box is prepared, about six inches square, with an opening in the top, about

three inches square, and another the same size in front. Each of these openings is covered with a wire-grating, close enough to prevent any bee getting through. This box rests on a stand provided with twelve wooden pins, four or five inches long, placed perpendicularly, in two rows, at the distance of three inches from each other. These pins should be so far separate as that five pieces of honey-comb, each about as big as a person's hand, may be placed between them.

Between the farthest of the pins, on the right and left hand, are put three bits of empty combs, the same height as the pins: a piece of very fine honey-comb, not candied, occupies the fourth place; and the fifth, which is the centre, remains empty. It is to be understood that the pins supporting the combs on both sides, keep them in a perpendicular situation, and prevent them touching each other, and that the spaces left between the combs is much about the same as those in the hive to allow free passage to the bees. Neither the honey-comb nor the empty combs ought to touch the board, in case of the moths taking possession of them; they are rather

made to rest on two little bits of wood, raised a little above the board, and crossed by the pins.

Above the combs and the pins, a large piece of comb is placed horizontally, and covering the whole, to keep in the heat while the hatching goes on.

After all these preliminaries, a fine day is chosen, about the end of April or beginning of May, according to the climate, and according as the season is more or less advanced; and, in the heat of the day, a little before noon, a strong hive, while in full activity, is lifted up, its top rested on the ground, and the bees driven off the combs with a little tobacco smoke, in order that the proper pieces may be seen and chosen.

A piece of comb, about the size of a hand, is then cut out, containing all the three kinds of brood, that is, eggs, nymphs, but principally the little maggots, just two or three days out of the shell. The hive is then replaced on its stand, and the little bit of comb that was taken out of it is put into the box, to occupy the empty space that was left in the centre, between the pins, and about a thousand or fifteen hundred bees, taken from a cluster in some other manner, are

then introduced, and the box closed, to prevent them getting out.

Their extreme agitation, approaching to despair, produces a heat so great that they would be suffocated, but for the wire-gratings above and in front. Towards night, when they become tranquil, nothing more is heard but a soft murmuring, and they begin to construct one of the great cells, that has its opening underneath, and in which they nurse and rear queens. Before the cell is completed, they carry into it a little maggot, out of the egg within two days; which being then suitably nourished, becomes a perfect queen in less than a fortnight.

For three days the box should be kept shut, and the light carefully excluded, for it would only serve to increase the agitation of the prisoners; and the upper wire-grating, being of no farther use, may be plastered over with a little clay. The fourth day the box may be carried to the apiary, and the bees set at liberty, by opening a part of the wire-grating in front.

Having now got a new establishment, with the certainty of soon having a queen, they think no more of returning to the hives whence they were

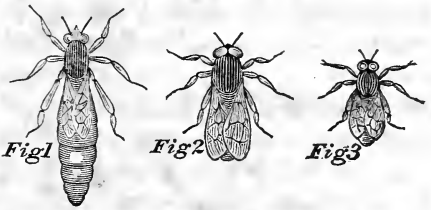
taken, but come and go, cleaning their little dwelling, and working like a weak swarm.

While they are thus occupied, a little cage should be prepared, in which to shut up the queen when her metamorphoses shall be completed.

This cage is of a semicircular form, and in size resembling the half of a large orange; it is made of wood, scooped out, and has a wire-grating on the front of it, so fine that no bee can get out or in: a hole is made in the lower part of it, large enough to permit a bee to pass through, and a wooden pin, from six to eight inches long, of the size of the hole, is prepared to shut it up with.

These preparations being completed, the box is opened fourteen or fifteen days after the bees have been put in, but it must be one of these fine spring days when the bees are busy at work: should the weather be cold or wet, the opening of the box must be delayed. The combs are then all taken out, and the queen will be easily discovered. She is much longer in the body, and altogether larger, than the other bees, as may be observed from the following figures, where

Fig. 1. represents the Queen; Fig. 2. the Drone; and Fig. 3. the Working Bee *.



* To those not much acquainted with bees, the following particulars may be useful.

Fig. 1. The *Queen Bee:* the head is of a triangular shape; her wings very short, not extending beyond the one-half of her body, which is longer, and more pointed, than that of the working bees. Her legs and corselet are copper coloured; thorax grey, and abdomen brown. There is only one queen to a hive; while there are from 10,000 to 15,000 workers, and perhaps 1000 or 1200 drones.

Fig. 2. The *Drone*, or Male Bee; the head is round, its large body is almost entirely covered by its wings. It has no sting. The drones appear only at the season of swarming, and are all put to death by the workers in the autumn.

Fig. 3. The *Working Bee.* Head somewhat triangular; the smallest and most numerous of the hive, which every one knows as the *honey-bee*, and which fabricates the combs, makes the honey, and feeds the young.

The queen must be seized by the wings and introduced, head foremost, through the hole into the cage, along with a dozen bees to bear her company, and then the hole through which they have passed is stopped up with the wooden pin. This being completed, an empty hive must be prepared, similar, in every respect, to the one out of which artificially the swarm is to be taken. A hole, parallel to that in the cage, is pierced in the bench on which it is to stand, and the end of the wooden pin fixed into it, so that the cage may be suspended, perpendicularly, about two-thirds the height of the hive. Between eleven and twelve of the same day, while the bees are mostly on the wing, a strong person takes one of the old hives, that is not likely to swarm, lifts it steadily, and rests it for a few seconds on a table, at hand for the purpose, while its place is instantly filled by the one containing the young queen and her cage. Any bees that may be grouped about the board are lifted up with a wooden spoon, and laid down at the door of the new hive; these ascend immediately; and all the working bees, returning in crowds from the fields, enter without hesitation; when,

finding neither combs, nor honey, nor any provision whatever, they go out and return several times, and fly round and round it; while the inhabitants of the old hive, having no suspicion of their place being changed, leave it without precaution, return to the situation of their ancient dwelling, and increase the swarm that is forming.

Wearied at length of their researches, and finding in this new establishment a great number of their companions, with an imprisoned queen, they unite themselves together at the top of the hive, begin, even the same evening, to build combs; and thus is obtained an excellent artificial swarm. Next day, and some days after, many bees continue to join them from the old hive, which delays not to repeople itself from the brood-comb with which it is filled, as it is not more weakened than if it had swarmed naturally. The second day after this operation the new hive must be lifted up, the cage taken out, and the queen set at liberty, which is easily done, by drawing out two or three of the wires that form the grating. It would not be possible to make her descend by the hole through which

she entered, and, by delaying too long to take her out, she would be completely surrounded by combs, that must be broken before she could be released. The precaution of keeping the queen in prison for two days is indispensable; for without this precaution she would be put to death as a stranger, or she might escape from the hive during the first tumult, which would cause the total failure of the swarm. But after being shut up in it for a little time, she is looked upon as the hope of the new colony, and sure of a favourable reception.

To succeed in this operation, there must be, at least, six inches between each hive: should they touch each other, many of the working bees would infallibly lose their lives, by throwing themselves into some of the neighbouring ones.

Such is the result of these tedious and difficult operations to obtain artificial swarms by the method of M. SHIRACH, at this time generally pursued in Germany. There is another, easier and less tedious, said to be in usage in the Archipelago, in Ancient Greece, and several other countries, which I have followed with great success.

Choose a hive of wood or straw, exactly the same in form and size of the one from which you mean to take the swarm. On a fine day in May, or, in mountainous countries, which are later, about the beginning of June, throw a few whiffs of tobacco-smoke into a well-stocked hive, turn it up, and, with a little more smoke, disperse the bees that are upon the combs; then cut out a bit of comb, about the size of the palm of a hand, taking care that there be the three kinds of brood, viz. eggs, maggots, and nymphs, already enclosed in the cells that serve them for cradles, but especially those maggots that have been hatched within two days; after returning this hive to its place, then proceed to fix the bit of comb with some wooden pins, in the top of the newly prepared one, and support it underneath with a thin chip of wood. Between eleven and twelve in the forenoon, lift a very populous hive (not the one out of which the brood-comb was taken), off its own board to another that must be ready to receive it, and put the empty one in the place it occupied. All the bees, returning from the fields, enter the one that has been substituted, seem at first to be

greatly agitated, but, by degrees, gather round the brood-comb, and begin before night to construct a royal cell, to which they transport a maggot of two days old, and where it undergoes its metamorphosis, and comes out a queen. By this method, I have procured excellent swarms from hives that would not have swarmed naturally; and, the following spring, renewed the old hives, after the manner indicated in Chapter XXI, thus preserving my hives in good condition.

CHAPTER XXIII.

ADVANTAGES OF ISOLATED HIVES.

A SWARM, taking flight, rushes out of the hive, and seems bent on fixing itself in some distant quarter, as if it feared the neighbourhood of other swarms—as if it felt that its most formidable enemies were those of its own kind.

Swarms will unite, however, when they take

flight at the same time, because the bees of one hive cannot be distinguished from those of another when on the wing, and crossing each other in every direction; and as soon as one group begins to knot upon a branch, the bees of the other crowd round, supposing them to be their companions. Their instinct, however, rather leads them to isolate themselves, as they do in great forests; but their proprietors resist this instinct, assemble a great many hives together in the same apiary, to shelter them from the weather, as well as to protect them from thieves, and to watch over them at the time of their emigration.

Such are, doubtless, great advantages, but not sufficient to counterbalance those that would result from keeping them separate. The mixing and uniting together of several swarms, that often take place in large apiaries, and which is not always an advantage, would thereby be prevented. There would be greater facility in forming artificial swarms, and one hive would not be disturbed in operating on another. The great expence of bee-houses would thus be spared; these are much more costly than stands for isolated hives, for which there is nothing more

necessary than a board, supported by a pile of wood, sunk into the ground, with a thatch of straw, which any one can spread over the tops of the hives, to protect them from the rain and the heat of the sun.

CHAPTER XXIV.

ENEMIES OF BEES, AND MEANS OF OVERCOMING THEM.

All amateurs that have written on the subject of bees, have spoken of their enemies, but few have given any directions in what way they may be overcome. I should neither attain my aim, nor realise the title of my work, if I did not notice them.

Nothing is more prejudicial to bees than ignorant attention. Their most formidable enemies are, perhaps, their possessors, who busy themselves to torment them, and weaken and kill them by too much care. In winter they hurt

them, by shutting them up for fear of the snow, without considering that many more perish in their unwholesome prison; and that the great humidity, having no outlet, moulds the combs, and sometimes even rots them. Who shuts up the wild bees in the forests of Lithuania, where they thrive so well? Their own instinct suffices; there they have no master to thwart them.

In spring, the giving them a little honey, that would suffice to save them, is not always attended to, neither is the guarding them from moths, which at that time make the greatest havoc, nor is the narrowing of the entrances to prevent them being robbed. In summer I have seen persons leave only very small entrances to very populous hives, even when the bees were forming clusters, and so increase the ardour and activity of the workers. But this embarrassment only pained them, and retarded the gathering and laying up of their store.

Some let swarms escape from mere carelessness. People suffocate them in autumn, that they may possess themselves of their provisions; and others take out the best of the honey and often too much of it, and so expose them to die

of hunger; and they even sometimes annoy them by leaving too great a quantity of candied honey-comb, which is of no use to them, and the extraction of it from the cells costs many valuable lives, as I have already observed.

I therefore place, in the foremost rank of their enemies, those of their *possessors*, who, by their own ignorance and inexperience, hinder them from prospering and multiplying.

Ants are their least dangerous enemies; true, the bees cannot sting them to death, because they are small and well defended with armour, but they seize hold of them with their teeth, and carry them to a distance. Had they not this means of getting rid of them, their colonies could not exist in the vast forests full of ants' nests, and where they thrive so well, in spite of the horrible massacres that annually take place. I have never seen a hive destroyed by ants; they attack only weak swarms, that have been either pillaged before, or happen to be established in a lodging too large for them to defend.

I recommend, however, to plaster up all chinks through which these little insects could gain an entrance.

Moths are little known, and never injurious, in the high valleys, nor on the mountains, but they attack and destroy a vast number of hives in the plains or in the vineyards, where they are a great scourge. As soon as a moth has penetrated a weak hive, it establishes itself in a comb, envelopes itself in a silken web, multiplies rapidly, consuming the wax, and spreading its destructive galleries from side to side, until, arriving at a certain point, the evil has no remedy.

I shall not repeat what I have said in the twentieth chapter, of the admirable ingenuity with which well-stocked hives defend themselves, by gnawing and reducing to crumbs every part of the wax that harbours a moth. Nor the means I have pointed out in Chapter VII. to diminish the number of their enemies in the spring, by frequently examining the little bits of wood used for contracting the entrance, or whenever the heated air of the hive is likely to attract butterflies, for the purpose of depositing their eggs. I shall only add, that when any trace of a moth is observed about a hive, it should immediately be cleaned away, and every little fragment of

wax be swept off the board. If, in defiance of these precautions, it should seem that the moths have invaded some of the combs, the only means of saving the colony is, to imitate the surgeon, who cuts off a deceased limb to save the other, —every bit of infected comb must be cut out, leaving only those occupied by the bees. And the bees must then be liberally fed, by giving them every evening as much honey as will maintain them until the fields shall yield them a sufficient quantity. Thus I have preserved hives whose circumstances seemed to be desperate.

Spiders annoy the bees much. The bees get entangled in their webs, and are not able to extricate themselves. Here cleanliness is the best protection; therefore care should be had to sweep the webs away from the hive and its avenues as fast as they appear.

Birds eat a prodigious quantity of bees, especially in spring, when the trees are in blossom. Whatever people may say to the contrary, I have reason to think that the swallows, which are perpetually cruising about in the air, like so many corsairs, destroy a great number, to regale them-

selves, and to feed their young: this was the opinion of VIRGIL*.

Moths destroy whole colonies: birds do not entirely destroy, but they diminish the population; the queens, especially, become an easy prey to them, their flight being heavy, from the great length of their bodies and shortness of their wings; and the queen, being the very soul of the hive, when she dies the whole will infallibly perish, if there is not some of the proper brood ready to fill her place; and, even in the latter case, the population is retarded in the fine weather, and the hive becomes languid. As this happened to me several times, I imputed it to the loss of my queens.

The poultry, too, that roam about near the water where the bees go to quench their thirst, gobble up a great many of them, making a constant war on them, as deadly as that carried on by the birds. I have even seen a tame magpie place

* "Absint.....meropesque, aliæque volucres,
Et manibus Progne pectus signata cruentis.
Omnia nam late vastant, ipsasque volantes
Ore ferunt, dulcem nidis immitibus escam."
Georg. iv.

herself between two hives, peck right and left, and snap up hundreds of bees to her breakfast. She was caught in the act, condemned to death, and executed in the same instant.

Mice, especially the red mouse, or *Sorex araneus*, sometimes penetrate a hive in the winter time, either from the entrance being left too wide, or by gnawing a hole for themselves in the straw. They eat the honey, and even the bees, when clustered together on the side of the hive, in which position they are unable to defend themselves, and scarcely even see the enemy. I have frequently seen a mouse's nest inside of a hive in spring, seemingly unperceived by the inhabitants.

Wasps are also reckoned among the numerous enemies of bees. I have, however, seldom seen a hive destroyed by wasps: although they are larger, stronger, and armed with a formidable sting, and an impenetrable cuirass, they seldom dare enter a well stocked hive. Once attacked, they soon fall beneath the united efforts of these brave citizens, who sacrifice themselves to defend the place of their nativity. Wasps only appear in great numbers when the fruit is

ripening, and then they range unceasingly round the hives, and enter the weak ones, or those of which the too spacious lodging bears no proportion to the number of its inhabitants. There are three ways of providing against the attacks of wasps. The first, is to unite weak hives by doubling or tripling the population, thereby enabling them to defend themselves. The second, is to contract the entrances as soon as the swarming time is over, after the massacre of the drones: and the third is, to destroy their nests.

The bees are continually fighting between themselves, and robbing each other; avarice, not necessity, leads them to do so, it being almost always the strongest and best provisioned hives that pillage the weak ones. When once a bee has been able to introduce herself into a hive, and carry away a load of honey without being arrested, she will return a hundred times the same day; and, making it known to her companions, they will then come in hordes, nor cease their pillage until there is nothing left to take. In one day the whole of the honey will be carried off, and with a determination which one can scarcely have an idea of without seeing it. This kind of

pillage is most frequent in the spring and autumn, and it is easier to prevent than to stop it; and, for this purpose, the entrance of the hives ought to be straitened in proportion to the population. Four soldiers, as I have already said, will more easily guard a narrow pass than thirty or forty would defend a great one. Whenever the bees cluster themselves in front of the hive, it is a proof that the whole of the interior is filled, and there is then no fear of pillage, excepting in a very rare case, when they happen not to observe the thieves, and of which I shall speak presently. In proportion as the cluster increases, the entrance should be widened, even opened entirely, and contracted again in the autumn after the destruction of the drones. When these precautions are not sufficient, and the pillage has commenced, it is not easy to stop it. It may succeed, however, in spring or autumn, by entirely closing the entrance of the besieged hive for one or two days, and putting a large cape upon it, or an empty hive, plastering it all round to prevent the bees getting out. This affords them a volume of air sufficient to prevent them from being suffocated, and they go up and down at

pleasure through the hole in the top of the hive from which the stopper must have been previously withdrawn; every evening the entrance must be opened to give them air, and carefully shut up again in the morning. I have always found the two days seclusion sufficient to put a stop to the pillage. But this means is not practicable during the hot weather, for then the bees would infallibly be suffocated, if they were to be shut up but one hour. In this case, I have saved several by covering them with a wet table-cloth, and extending it over the front of the hive. The thieves, who were arriving in hundreds, threw themselves into the neighbouring hives, where they were arrested and killed; for all theft, even suspicion of theft, is invariably punished with death in these republics. Some of the thieves that happen to escape, regain their own dwellings, and warn their companions to beware of returning, and next day there will be no more thieving. I have never been obliged to spread the wet table-cloth a second time. True, many of the bees of the hive I was defending were sacrificed, returning from the fields, and being unable to gain admittance, they perished in some

way or other; it was a small sacrifice, to avert a greater evil, but my hive was saved, and that was my object. It is a cure that does not always succeed, however, and is quite useless when the besieged hive is a weak one, or if much of the honey has been carried away.

I shall not speak of toads, lizards, and all kinds of reptiles, that are ranked among the enemies of the bees, for I have never seen that they did them much harm.

CHAPTER XXV.

DISEASES OF THE BEES.

Bees have no real disease. Dysentery, about which so much noise has been made, and for which so many remedies are prescribed, never attacks the bees of a well-stocked hive, that is left open at all seasons, but only those that are too long and too closely confined. They are always in good health as long as they are at liber-

ty, when they are warm enough, and have plenty of food. All their pretended diseases are the result of hunger, cold, or the infection produced by a too close and long confinement during the winter.

Some intelligent people have erroneously thought that the honey gathered from the flowers of the lime-tree caused dysentery, but experience convinced me to the contrary; for my hives were never in better condition than when the lime-tree flowers supplied them with honey in abundance.

CHAPTER XXVI.

OF THE DIFFERENT VARIETIES OF BEES, AND THEIR LANGUAGE.

Almost all authors speak of four different kinds or varieties of the honey-bee. I frankly acknowledge that I know but of one; and that all the bees I have seen are equally profitable when properly taken care of. It is true my travels have not been very extended.

As to their language: a slight buzzing or confused noise and a sharp sound, are signals by which they proclaim their danger, or seek assistance from each other. They appear to have the power of communicating their desires, their fears, their situation, and their circumstances. Their language, or whatever name is given to it, suffices to procure a concert of wills and actions, absolutely to attain a certain end; and of which I shall give a few examples.

When a hive has lost its queen, a general agitation takes place, that cannot escape the notice of the most ordinary observer. They seek about for her on all sides, and, if she cannot be found, they set to work to supply her place. For this purpose, a great cell must be constructed, to serve her for a cradle: a single working bee cannot manufacture it. There must absolutely be a concerted plan,—to choose the place to do the work—to transport the newly hatched maggot —to nurse it suitably—and properly to close the cell when it is to undergo the metamorphosis.

There must also be the same re-union of wills and efforts, when it relates to the getting rid of a moth that has established itself in a comb;

they must ascertain its presence, feel the evil it may do, examine with care the extent of its galleries, and agree in the plan of attack and mode of operations; and how can they form and execute this plan, without the perfect concurrence of a great number of labourers? Such agreement is impossible without some sort of language.

Is the hive to be cleaned? A general assessment is commanded, and the people instantly obey. A throng of labourers remove the dead, carry out the little bits of wax that are on the board, which would otherwise serve to feed the moths. Each of these crumbs costs them a journey; and that toil is spared them when care is taken to scrape and sweep the board from time to time.

Another scheme of agreement that indicates a language, is where a bee finds honey, whether in a room, where it may have been deposited without shutting the windows, or in a stranger hive, where it has gained entrance. It communicates it to its companions, who rush out by hundreds or by thousands to obtain a share of the booty. How could they give this advertise-

ment, without a species of language understood by every one of them.

CHAPTER XXVII.

SIGNS OF RECOGNITION AMONG THE BEES.

THE bees of a hive have the means of recognition, and of distinguishing their companions from every stranger bee; without which they could not defend their honey. In vain would the Creator have armed each of them with a formidable sting, had they not been also given to know the enemies which that sting was to pierce. Strangers would have gone in and out without risk of detection or punishment, mingled with the workers, and deprived them of treasures industriously collected. But the All-wise Author of Nature, who has given them the means of defence, has also endowed them with the instinct to distinguish enemies from friends, even among their own species. Let a bee fall by accident,

or be driven by the wind, into a hive not its own, it is seized as one suspected of evil intention, and put to death that moment.

What is their signal of recognition? What is the organ and the instrument? Is it the antennæ,—those little flexible horns in front of their heads? or is it by the smell they recognize each other?

A great inconvenience attending crowded apiaries is, that two or more hives may have the same signal; but happily, in this case, which is a rare one, they have the power of changing the signal; in proof of which, the following circumstance happened with mine, in one of the most abundant honey seasons.

In the month of May I had lodged my first swarm, which was a very strong one, in a large straw hive. The weather being very mild, they set to work immediately, and very soon filled more than half of the hive. In a few days, I observed it was invaded by a swarm belonging to one of my neighbours; that they went in and came out, without being detected; and that they were carrying out as much honey as my bees were bringing in.

I shut up one-half of their door; and, for nearly a whole week, whenever I was at leisure, I stationed myself near my swarm, and killed every day hundreds of the thieves, which were easily distinguished by their shape,—slender enough when they went in, but puffed up as they came out, with as much nectar as they could contain. This, however, did not stop them, and they continued coming and going, in greater numbers, till night, and beginning again early in the morning.

I had plenty of sport, but my labour was in vain, and I began to despair of saving my swarm, when, one afternoon, I perceived it to be agitated and troubled, as if it had lost its queen. The bees buzzed about before the hive, and on the board, smelling and touching each other, as if they would have spoken. It was to change their signal, and which in fact they did change, during the night; and all the strangers that came next day were arrested, and put to death. Some escaped the vigilance of the guards that defended the entrance, and doubtless warned the others of the danger they had escaped, and that they could no more plunder with impunity: they returned

no more, and my hive prospered wonderfully. I have, in the course of my life, seen only other two similar instances that had the same result.

CHAPTER XXVIII.

PRESERVATION OF HIVES IN WINTER, AND MEANS OF PROTECTING THEM FROM THE COLD.

THE most important point that remains to be treated, is the preservation of hives in winter. This severe season, which lasts at Neufchatel four months, from the commencement of November to the end of February, and which is even longer in the mountains, causes the death of more bees than all the enemies of all the other seasons put together; and mostly, too, from our own want of attention. It is by practice only that true principles can be laid down: and these principles must be variously modified, to adapt their application to the differences of temperature and locality. One can learn with certainty only by the

light of experience. I shall proceed to tell what it has taught me; and here I enter on the most difficult and the most essential part of my task.

We must suppose that the necessary care has been taken to ascertain that each hive has the quantity of provision necessary for its subsistence until the return of the fine season, and it is better that they should have too much than too little; for bees are great economists, and never waste their superfluity.

I lay down as a general rule, and without any exception, that bees ought never to be fed during the winter. Food given them during that season causes disease, breeds infection, particularly if they are kept confined; and if they are at liberty, and forced out by the unwholesome smell of the hive, they are likely to perish from the cold. Besides, it always appeared to me that they consume more when food is given them by little and little, than when they have it in store. I have pointed out, in Chapter VIII. the certain rule by which the quantity of provision may be estimated; and, in Chapter XVII. I have detailed the method of supplying them in autumn. Thus they will be saved from hunger, if my advice be

followed. Let us now see how they may be defended from cold, and the fatal effects of a long imprisonment. Some winters are so long and so rigid, that our valuable insects suffer greatly from the intensity of the cold; and the least evil it does them, is to crystallise their honey, which is then no longer of any use to them. The warmth keeps it in a fluid state; but this warmth, concentrated in the middle, or on one side of the hive, does not prevent it being candied in the other parts of it. More candied honey will generally be found on one side than the other. This may be prevented by narrowing the entrance, and closing up every crevice by which the external air can penetrate. Our industrious and provident little labourers set the example. Their instinct leads them, during the summer, carefully to close up every crack or joining of their habitation, with a sort of gummy matter called *propolis*, which cannot be penetrated either by the mice, the moths, or the ants. I have seen an excellent swarm perish, in consequence of a slight bend in the board, which left an interstice on each side, through which a cold north wind sifted, and froze more than three-fourths

of the bees; and no after care was able to save those that were left.

Two years after, another hive, belonging to the same person, carefully plastered round, but being made of too slight material, too thin, and having no covering, lost at least two-thirds of its population from cold. It was saved, however, by great care, and in time recovered. It is to avoid similar disasters that hives are commonly taken into the house; but this exposes them to the evil arising from infection.

A thick strong-made hive is a more certain protection from the cold than one that is thin and light. It keeps in the warmth, like suitable winter clothing; while the other resembles an unseasonable summer garment: and, for this reason, I have recommended, in Chapter VI. not to spare the *material*. Notwithstanding the excessive cold of Lithuania, and the north of Russia, the swarms succeed in finding for themselves a comfortable abode in the hollows of the thick oak-trees, through which the cold does not penetrate. But, in addition to the warmth arising from the thickness of the hive, I always cover mine, during severe weather, with a piece of old

blanket, or some such thing, to check the first impression of the cold; and as few country people have a thermometer, by which to estimate the degree of temperature, they should hasten to thatch, or cover them, in some way, whenever they perceive the hoar frost on the glass of their windows, which will be the case when the common thermometer of Fahrenheit descends three or four degrees below the freezing point.

CHAPTER XXIX.

MANNER OF PRESERVING HIVES BY TAKING THEM INTO THE HOUSE IN WINTER.

It is generally supposed that, in the high valleys, and in the mountains, bees can only be preserved by taking the hives into the house in winter, where they must remain, until the snow has disappeared, before they can be set at liberty. I had this fatal prejudice for many years; but it was dispelled by the success attending the union

of the five swarms of which I have given a detailed account in Chapter XVIII., at which time a ray of light broke in upon me that has since continued to guide me.

The following winter I left out the one-half of my hives, and moved the other half into a cold room, according to my usual custom, where all the pains I bestowed upon them did not altogether keep them alive, nor preserve them from damp and infection. In vain I swept and cleaned the boards, or placed them on dry hay to absorb the moisture; in vain I gave them capes or joinings. With all my care, there was not one of them free of diseases and infection. The winter was long and severe; and they could not be returned to the air before the last week in March, by which time they were feeble and languid, and far less prosperous than those that had passed the winter out of doors. From that time, I have never taken one into the house. But, as hives that have been weakened by giving out too many swarms, especially swarms of the same year, that have not nearly filled the interior of their habitation with combs, are less subject to become overheated, and to mould, than those that are

quite filled, and of which the population is very strong, the inhabitants of the mountains might have the latter in the open air all winter, and only move the others into the house. They will find, as I have done, that strong well filled hives are far best out of doors, provided they take the necessary precautions to prevent them from freezing.

I have somewhere or other read an account of a very ingenious method of preserving hives in winter, but have not made trial of it, in consequence of not having a place fitting for it. According to this plan, one must have an empty room, very cold and dry, in which, from end to end, two long poles are suspended parallel to each other, and a foot of distance between them. As soon as the severe cold begins, and the thermometer is at the freezing point, the hives are all moved into this room, and set up upon the poles, without any board beneath them, and separate about half a foot from each other. Each hive must be numbered, and the numbers noted down, as well as the board and place that each occupied in the apiary, in order that they may be replaced in exactly the same situation on the

return of spring. This done, the room is darkened, as the smallest ray of light will induce the bees to quit their hives; and, in this manner, they may be preserved in a healthy state, and without diminution of their numbers, during the winter; and, from being left entirely open below, any dead bees, or bits of wax, fall on the floor, and they escape the danger of infection.

On the return of the fine season, and early in the morning of a calm day, the room is opened, and each hive returned to its own place on the apiary.

I have reason to think that hives, wintered in this way, will consume a quarter, a third, or perhaps one-half less provision than others, if left on the apiary, or shut up entirely from the air; but we must attend less to the rigid economy of the honey, than to the preservation of the valuable insects that collect it for us.

I possess only the theory of a practice of which I should have gloried in being the inventor, as it appears to me infallible, and advantageous in all its relations, but more especially to the inhabitants of the mountains. There two or three people might hire a room among them for the pur-

pose; and, should the air become impure from so many hives being closed up together, it could be purified by opening the door during the night, and closing it well up again in the morning.

CONCLUSION.

I HAVE now given the result of sixty-four years experience. This little memoir has extended beneath my pen far beyond my original intention; but it was of consequence in describing the new methods I had adopted, to give my reasons for every thing I recommended; and, for this purpose, to enter very minutely into the details. I have not written with elegance, but have expressed myself plainly; and, in giving the account of my experiments, it seemed to me that, to be clearly understood, I ought to relate naturally how I set about them, as the different circumstances occurred, and that every reader could more easily follow me, in seeing me *act*, as it were, than if I merely laid down general rules. Those I have given, have the rare advantage of

being applicable to every kind of hive, of wood or straw, whether large or small, and of whatever form or shape. I have not recommended any one kind in particular, not even those that bear my name, as I consider them all equally profitable when skilfully taken care of. Every one may make use of such as he likes best, or such as he can most easily procure. I wish not to lead the apiarian into any expence, but to point out to him clearly those principles and rules that he should not lose sight of, if he wishes to preserve his bees and to profit by them.

If this little work is favourably received by the public, and if my life is spared, I may be induced to give it a sequel, in which will be found new ideas concerning the drones, and their destination, with several experiments to discover if it is of any use to assist the bees in killing them; calculations of the yearly and average profit of a single hive, by which I would encourage the cultivators to work a rich mine whence great profit may be drawn; and also directions for purifying the honey, as well as for melting the wax, none of which could have a place in this little book, the sole object, as expressed in the title, being the *preservation of the bees.*

Diminution of the Weight of my Hives during the Winter—from the 20th September 1813 *to the* 31*st March* 1814.

STRAW.

No. 1.	diminished	10 pounds.
2.		10½
3.		12½
4.		12
8.		11
10.		9
11.		8½
13. doubled in October,		11
15.		10½
16. doubled,		10½
17. doubled,		14
20.		10
21.		14
22. doubled,		8½
23.		10½
24.		9
25.		15
26.		12½
27.		10½
30.		13
32.		9½
38.		8

A.	9½
B.	10
C.	12½
D.	10½

WOOD.

No. 1.	diminished	11½ pounds.
4. doubled,		9½
6.		11
7.		8½
8.		19
9.		10
11.		15½
13.		15
21.		10
23. doubled,		11½

To know exactly if the consumption of united hives was greater than that of those hives whose population had not been augmented, I weighed thirty-six hives on the 31st of March 1814, that had been previously weighed on the 20th September 1813; but I omitted those from which I had taken honey, as well as those I fed, as I did not weigh them. It may be observed, by the foregoing table, that the most economical expenditure anounts to eight pounds of honey, and

that the greatest consumption is nineteen. I can attribute this enormous difference to nothing but pillage. It is very likely that the straw-hive, No. 38., must have enriched itself with booty in October or in March, while the wooden hive No. 8. had been plundered. Of these thirty-six hives, six had been doubled in October, by the introduction of a strong swarm into each of them, and we see that their expenditure has not been greater than that of those colonies that were left single. In the course of six months and eleven days, one diminished only eight pounds and a half; one, nine and a half; one, ten and a half; one eleven; one, eleven and a half; and the least economical, fourteen pounds. This comparison demonstrates, that hives, doubled by the re-union of the bees of another hive, consume no more in winter than less populous hives, left in their natural state. The fact is clearly proved, though I am ignorant of the cause. I ought to observe, that all these doubled hives, with the exception of one old one, twenty-two years of age, prospered perfectly the year following, and gave me more honey and more swarms than all the others.

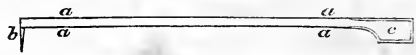
NOTE BY THE TRANSLATOR.

Some friends, for whom I entertain a very high respect, have remarked, on reading the proof sheets of this translation, that Gelieu appears to be very successful in preserving the bees, but that he does not prove so clearly that any great increase of honey is thereby to be obtained. To the practical apiarian this objection will never present itself; but, for the satisfaction of those who are not acquainted with bees, I regret not being in possession of Gelieu's calculation of the average profits of single and doubled hives; and I regret more especially, that, during the few years my attention has been directed to the management of bees, I have been contented with remarking the thriving condition of the apiary, without giving myself the trouble to calculate the exact amount of its produce. Those, however, who are accustomed to observe and to take care of

bees, will know that the whole value of the hives depends on the swarms being large and early, and will therefore see at once the advantages to be gained by attending to GELIEU's directions. The results of my own experience are, in other respects, as follows.

I have tried hives of various kinds: those of the common shape, made of straw; the still prettier sort, made of sea-shore bent (*Arundo arenaria*); the square-storied hive of wood; also the Huish hives; and, consequently, have had an opportunity of assuring myself that the success of the apiary depends neither on the form nor the material, but entirely on the treatment the bees meet with, and that hives may be made, with equal success, of whatever is most easily obtained in the district they are to be used in, always provided they are kept clean and are well managed. In some of the high valleys of the Alps, where straw is not to be had, and where every blade of grass is carefully economized for the use of the cattle, the hives are merely rough blocks of timber, sawn across the stems of the pine tree, and rudely scooped out to receive the swarms: these answer the pur-

pose just as well as other hives; and the only or the chief difference, is the greater or less facilities which each affords for the extraction of the combs; an operation of easy performance in the Huish hives, when its inventor's directions are adhered to. But, in Switzerland, the same process is accomplished without difficulty in hives of any shape or material, by means of a knife, which is so simple in its construction, and so easily used, that it deserves to be made generally known. I therefore subjoin a figure, with a description and a note of the dimensions, from which it may be made by any country blacksmith.



This figure represents the shape of the knife; it is formed merely of a slip of iron, about two feet long by an eighth of an inch thick. The two horizontal lines *a a* shew the size and appearance of the handle, which is twenty inches long by half an inch broad. The turned-down blade (*b*), of two inches in length, is spear-

pointed, sharp on the edges, and bent perpendicularly from the handle. The other blade (*c*) is two inches long by one and a half broad, and sharpened all round, as marked by the double black line.

The broad blade (*c*) cuts and separates the wax from the sides of the hive, and the spear-point (*b*), which is also sharp on each side, admits, from its direction and narrowness, of being introduced between the combs, to loosen them from the top of the hive; and, for the same reason, it also answers the purpose of pruning the combs.

The honey-comb which is thus extracted, or which is obtained from the capes, is greatly superior to that which is suffered to remain in the hives till the autumn. The wax is thin and transparent, and the honey, being newly drawn from the nectaries, is particularly rich and delicious, as it has not had time to lose the fragrant and delicate flavour of the young flowers.

Huish, it may be observed, gives very clear directions for extracting the combs from the hives that bear his name; he also recommends the uniting of swarms; but I could never

obtain his instructions on this latter point. Doubting nothing of its practicability, however, I made the experiment, but having no guiding principle to direct me, it was like going to sea without a compass; and, in consequence, my hopes were soon wrecked, and I had the misery of seeing the whole of the swarm that I had saved from suffocation, speedily put to death by the bees of the hive that I had so rashly forced it to enter. The result, however, was widely different when I made the trial again last autumn, guided by the directions contained in this little volume, for I accomplished the union of my swarms without difficulty—even without previously having seen it done, and without having received a single sting; and I had thus the pleasure of witnessing my hopes crowned with complete success.

For this operation, it is not necessary either to have the courage of a warrior, or the intelligence and coolness of a philosopher like M. DE GELIEU. An ordinary degree of judgment to understand his directions, and confidence enough implicitly to follow them, will enable any one to perform it, provided he sets about it cautiously, and takes

care not to hurt the bees, or to handle them roughly.

I managed it, with the assistance of two persons, without gloves, or any shield or shadow of defence, except a little tobacco-smoke, involving us, as it were, within the influence of a charmed atmosphere, that seemed to stupify the bees, and render their sting powerless, while it inspired us with confidence to proceed. I recommend it being done at first by three persons, one to manage the hive and extract the combs, another to sweep the bees back gently with a feather or goose-wing, and a third to manage the fumigating bellows; or, if the fumigating-bellows are not at hand, to blow occasional whiffs of smoke from a tobacco-pipe.

When my first cluster of bees was shaken out of the pillaged hive upon the table-cloth, I had the happiness of seeing them instantly begin their ascent (not on the wing) but in a regular march. It was a spectacle of intense interest. They entered the full hive as orderly and as peaceably as any body of regular troops ever took possession of a citadel; and next day the original possessors and the new settlers, were

seen, in perfect harmony, working together for the general good.

But whether they thought proper to kill a queen for themselves or not, was a fact that I had no means to ascertain.

Thus encouraged by my first experiment, I proceeded to extend it. My whole apiary consisted of eight Huish hives, isolated on single pillars of wood, at the distance of three feet from each other. We emptied three more of the hives, and joined a swarm to each of the remaining three, making four doubled stock hives. The gardener who has the care of them, had five hives of his own, three of which were deprived of their honey in the same way, and the swarms joined to the remaining two, which he had kept as stock hives; and I am now enabled to state exactly the quantity of honey that each has consumed from September 1828, to the end of March 1829.

No. 1.	diminished . .	12 lb.
2.	. . . .	9
3.	. . . .	12
4.	. . . .	11

The Gardener's Hives.

No. 1.	A large common hive	17 lb.
2.	A Huish hive, .	13

It ought, however, to be mentioned, that my four hives got a pound and a half of honey among them, in February; but those belonging to the gardener got no feeding. The entrances of all of them were left open during the winter, and there were not altogether above two dozen dead bees found on the boards, when they were lifted to be weighed.

The gardener's hive, No. 2., received two swarms in addition to its own; and this allied army took possession just as peaceably as the others, and actually consumed less honey during the winter than No. 1., which was only doubled. In effecting the union, the citizens had been plentifully regaled with a sprinkling of liquid honey, previous to the introduction of the strangers; and there were as many luscious drops of the banquet left, as gave the new comers no disrelish to their quarters.

For some years past, I have suffered no sticks to be put across the inside of any of my hives, as they render the extraction of the combs impracticable.

It may be right to add, in conclusion, that I have, in one or two places, slightly altered the

text where the meaning seemed obscure, and where mistakes might otherwise have occurred. I ought, perhaps, to have translated these passages quite literally, and to have corrected them in separate notes; but ignorance of book-making must be my excuse.

FINIS.

P. NEILL, PRINTER.